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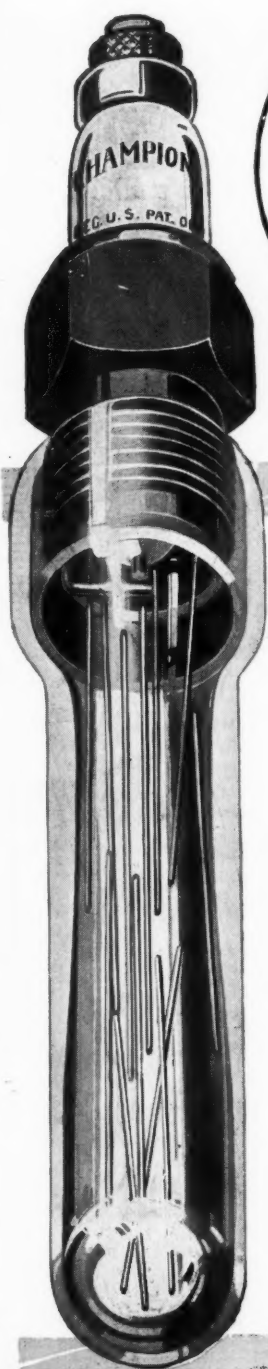
# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

Vol. XXXVII  
No. 21

NEW YORK, NOVEMBER 22, 1917

Ten cents a copy  
Three dollars a year



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**W**ITHOUT taking the plug apart, in a fraction of the time it used to take to *half-clean* your spark plugs, you can now get them *really* clean without even soiling your hands.

Just half fill the tube of the cleaner with gasoline, screw the plug in the socket at the top and give it a vigorous shaking.

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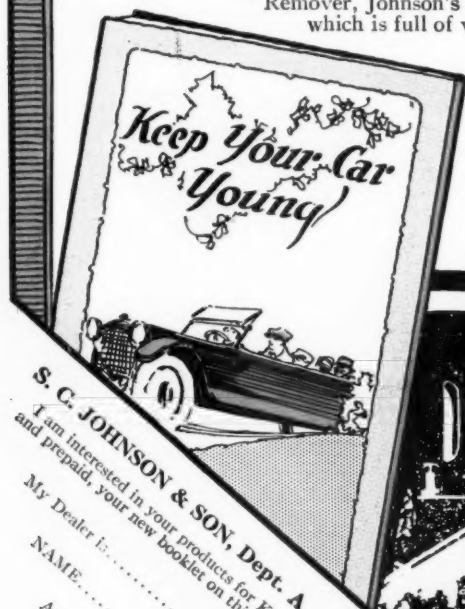
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# AUTOMOTIVE INDUSTRIES

## *The* AUTOMOBILE

VOL. XXXVII

NEW YORK—THURSDAY, NOVEMBER 22, 1917—CHICAGO

No. 21

**“THE** question of the future of British Motor Industry becomes, therefore, a matter of more than sectional importance; it becomes one of Imperial concern.”

*—Association of British Motor and Allied Manufacturers, Ltd.*

¶ This is how essential the passenger automobile industry is regarded in Great Britain after 3½ years of war and after being entirely suppressed for 18 months.

¶ Does the United States desire to render chaotic and disorganized its automobile industry in the face of this British verdict?

¶ Current suggestions to turn over automobile factories without profit for the period of the war will jeopardize good will of makers and penalize our third manufacturing industry in critical days when it is essential to our national life.

BY DAVID BEECROFT

**T**HE time is at hand when individual patriotism must give way to constructive patriotism to industries, and when we must cease blindly legislating our automobile industry out of existence as Great Britain did without obtaining all of the facts in the case.

Passenger car manufacture has been suppressed in Great Britain for 18 months, and since Nov. 1 this year the use of passenger automobiles has prac-

tically ceased. Our London correspondent writing under date of Nov. 1 says that London streets are practically denuded of motor cars except for taxicabs, and that the passenger automobile is not used except in summoning a physician or some similar mission that will satisfy the London police.

**AFTER SUPPRESSING THE PASSENGER CAR INDUSTRY IN GREAT BRITAIN, THE GREAT DAILY PRESS AND THE ENTIRE PAS-**



**SENGER CAR INDUSTRY HAVE GONE ON RECORD IN THE LAST FEW WEEKS TO THE EFFECT THAT THE PRESENT SUPPRESSED BRITISH MOTOR INDUSTRY IS MORE THAN A MATTER OF SECTIONAL IMPORTANCE; IT IS ONE OF IMPERIAL CONCERN.**

The British passenger automobile makers find the consequences of suppression amazingly more ramifying than was at first thought possible, and see in the present disorganization and chaos a problem of reconstruction that may extend over many years and call for Imperial action that will injure British motor prestige in neutral if not in colonial fields as well.

#### **"Sap and Life" of Business Sacrificed**

The British makers see their good-will, which they describe as the "sap and life" of business, sacrificed by the suppression of the industry.

British makers see the government's plan to treat all members of the industry alike failing hopelessly in actual practice during 3 years of war.

Passenger car makers whose business was turned over entirely to shells and munitions are to-day without good-will, the foundations to their organizations gone, the market possessed by others (largely, in fact entirely, by Americans), and worst of all the 20 per cent added war profits not sufficient to meet the problem of reorganizing themselves after the war.

The motor truck makers, conscripted entirely to the production of one model of motor truck (3.5-ton) find their sales organizations wholly depleted, and their 20 per cent added war profits not sufficient to meet those post-war conditions when thousands of used trucks released from army service will be thrown on the market and the makers will be responsible for their maintenance, upon which depends the good will of their company. Their inability to maintain their good name will discount them and handicap them in that fierce competition of reconstruction days.

#### **Good-Will of British Maker Waning**

Already evidences of waning good-will confront the British maker, not only in neutral and allied markets, but in the Colonies, Canada, Australia and South Africa. The complete suppression of the industry has made it impossible to give colonial agents their supply of spares, that attention to trouble connected with maintenance, that promptness of service necessary to retain the good-will of the colonial distributors and agents that is essential to continued relationships.

The British motor maker sees in a truer vision to-day the importance of post-war days and reconstructive problems. He begins to realize how inadequate the 20 per cent war business profits permitted by the British Munitions Act will be for the reconstruction work.

"Owing to special war taxation there will be a shortage of liquid assets available for the transaction of business and development of new markets, and reorganization and sales. Assets in the form of increased buildings or plants cannot be made available for such purposes." This extract from the memorial aptly expresses the British manufacturer's part in the memorial after 3½ years of suppressed industry.

#### **Great Lesson for America**

So great a matter of Imperial concern is the present condition of the suppressed passenger car industry in Great Britain that already drastic steps for reconstruction are being formulated, steps that reach to the very roots of the industry.

*And herein is our great lesson from the experience of our British allies. The plans involved embrace the adoption of those bulwarks of standardization and production that have given our passenger car industry the world leadership.*

1. *The entire British industry must be standardized as is the United States industry.*

"The war has taught many lessons, not the least of which is the fact that it pays to concentrate upon a single type and to produce it in quantity. Further, it is seen that through the medium of the one-model policy, co-operation of a most valuable character becomes feasible between manufacturers. A co-operative group may, for instance, combine their forces and maintain a joint depot and agent in each market instead of as heretofore each manufacturer supporting his own branch establishments and agents. Such a policy would effect economies of the first order, particularly in selling and advertising expenses. It would also allow bigger stocks to be kept abroad and would place the agent in the happy position of being able to keep under one roof and offer to the oversea customer a complete choice of cars and other vehicles, from the lordly car de luxe down to the humble motorcycle, as well as from the most powerful lorry down to the light delivery car. He would further carry large stocks of spare parts, and probably run in conjunction with his store a thoroughly efficient repair department.

#### **Individuality of Product Retained**

"A strong feature of such an arrangement would be that no firm would risk in any way the loss of the distinctive individuality of its products, or of the reputation which it may have already secured in the world's markets; since, as said above, each member of the group would concentrate upon the output of a specific model not competing with the product of any other member of the same group.

"That some such co-operative policy is eminently desirable is freely admitted by many of the responsible leaders of the industry; and though there are undoubtedly many difficulties in bringing about concerted action on the lines indicated, such difficulties



should not prove insuperable. The incidental advantages accruing to British trade from such a scheme would be many and various. A group might, to give a single instance, agree within themselves to use magnetos, tires and other details, of British make only, thus stimulating British industry in numerous directions."

2. Import duties imposed with a view to strengthening British industry after the war should apply for at least 5 years, and should apply to all components and accessories as well as complete vehicles, chassis, motorcycles, side cars, and parts.

3. Heavy taxation to users of motor cars as such should be discouraged (that is high gasoline taxes, license duties, etc.), as these burdens tend to limit the extent of the available market.

4. After the war the government, municipalities and public authorities throughout the empire should agree to accept tenders for vehicles, etc., only from British and colonial manufacturers. (In Paris every vehicle licensed for public use must be guaranteed by the French manufacturer—why should similar regulations not apply to the British Empire?)

5. The misuse of the term British by alien firms in Great Britain and Colonies will cease.

"If the present system of preferential tariff for British goods entering the self-governing dominions

is perpetuated the conditions should be revised so as to distinguish between goods genuinely British in manufacture and goods merely assembled in British territory. The former should be given a higher scale of preference than the latter; and conditions applying to all overseas dominions should be identical. The term British used by alien firms for their branch establishments in the United Kingdom should be discouraged by suitable legislation."

### Motor Industry Vital to War

The complete state of the British industry is summed up in the words:

"The British motor industry has proved itself to be vital for the purpose of war; it is doubly vital for the purposes of peace.

"Therefore, if the motor industry is to profit by the lessons of the war and emerge successfully from the fierce competition which will ensue after the coming of peace, it must set to work to introduce methods altogether novel to many minds engaged on it.

"The war has shown us that *laissez-faire* must give way to hustle. Competition between firm and firm in the same line of business must give way to co-operation, specialization, and organization to the highest order."

## The American Application

THIS message from the passenger automobile industry of Great Britain is timely in these days when the War Industries Board is threatening the industry in America with very serious reductions, due to alleged shortage of alloy steel.

This message as to the actual problems ahead of the British industry is doubly important when individuals from our automobile industry are attempting apparently to dictate what should be the government policy toward the automobile industry.

This message is doubly important when in government circles too many hold the position that the passenger automobile is a non-essential and as such should be one of the first industries to be curtailed and perhaps completely suppressed as in England.

This message suggests that the one thing to do to-day is to avoid hasty action and be sure of the steps taken. We do not think this is a time when individuals should be heard too loudly, but rather when the individual must suppress himself for the good of the industry.

In any democracy there is a danger of the individual receiving too much attention and the collective party, which might be the state, not receiving enough. The condition is the opposite of that in an autocracy.

Supposing the largest corporation in each industry were to offer its entire manufacturing facilities

to the government for the duration of the war without one cent of profit, what would be the result on our industries?

We can only see bankruptcy staring in the face of those industries and a very serious effect on millions of stockholders more or less dependent upon such industries. It is well known that the Steel Corporation can fabricate steel cheaper than any of the independents and that the government price fixed on steel permits a legitimate profit for the small maker and a considerably greater profit for the Steel Corporation. Supposing the Steel Corporation had offered its entire organization to the government for the period of the war without profit. What a serious situation would have ensued!

*These are not days for such individualistic action. These are days when the largest corporations in any industry must have regard for the others in those industries. The body politic must be kept in a most vigorous condition.*

Henry Ford's offer of his entire factory and 150 assembly plants to the government for the period of the war is very patriotic viewed from the individual point of view of Henry Ford, but we cannot interpret it as a patriotic act for the industry. Undoubtedly Mr. Ford, owning approximately 62 per cent of the stock in his corporation, does not require any profits even if the war should continue for 10

years; but what about some of his stockholders who control only 38 per cent?

How about the tens of thousands of stockholders in U. S. Steel should that corporation make a similar decision? How about the stockholders in General Electric, or Westinghouse, or American Locomotive, or Sears-Roebuck, or American Tobacco—should they take the same stand as Henry Ford? Where would our subscribers for future Liberty Loans, which we will in all probability place every six months, get the necessary funds, if such action were taken?

In these war days the individual must suppress himself for the general good of the industry and not elevate himself at the apparent expense of the industry.

The memorial regarding the British industry, after 3½ years of war, brings to light many important facts. Foremost is that the feeling is growing that the automobile is an essential, much more so than it was imagined at the opening of the war. A recent bulletin of the Chamber of Commerce of the United States contains some illuminating information on essential industries, and which we are quoting here because it is particularly applicable to the British motor industry to-day. The strong point is that to get necessary raw materials from different countries you must furnish those countries what they are in need of. Here is an extract from the bulletin:

"To determine the raw materials which must be imported for war production in this country and for the maintenance of our essential industrial life, involves what we are to produce for our armies and the extent to which normal industries are to go forward during these times, and how far our raw mate-

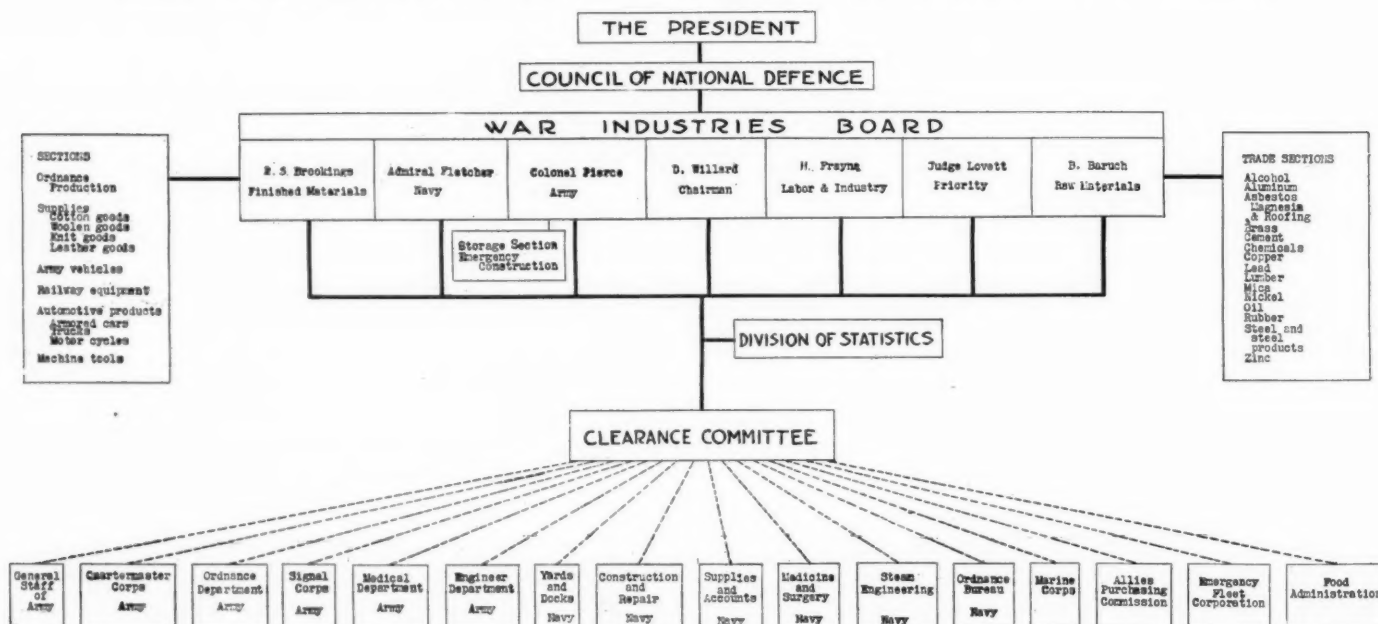
rial requirements can be met from our own production. At the same time there must be discussed the great problem of what industries are essential and what are unessential during the war.

"Before a conclusion can be reached as to what is a non-essential industry during the war there must be known what is needed from abroad and what we may send in exchange, for what is apparently non-essential here may be productive of most important materials for the war by being sent abroad in exchange for essential materials.

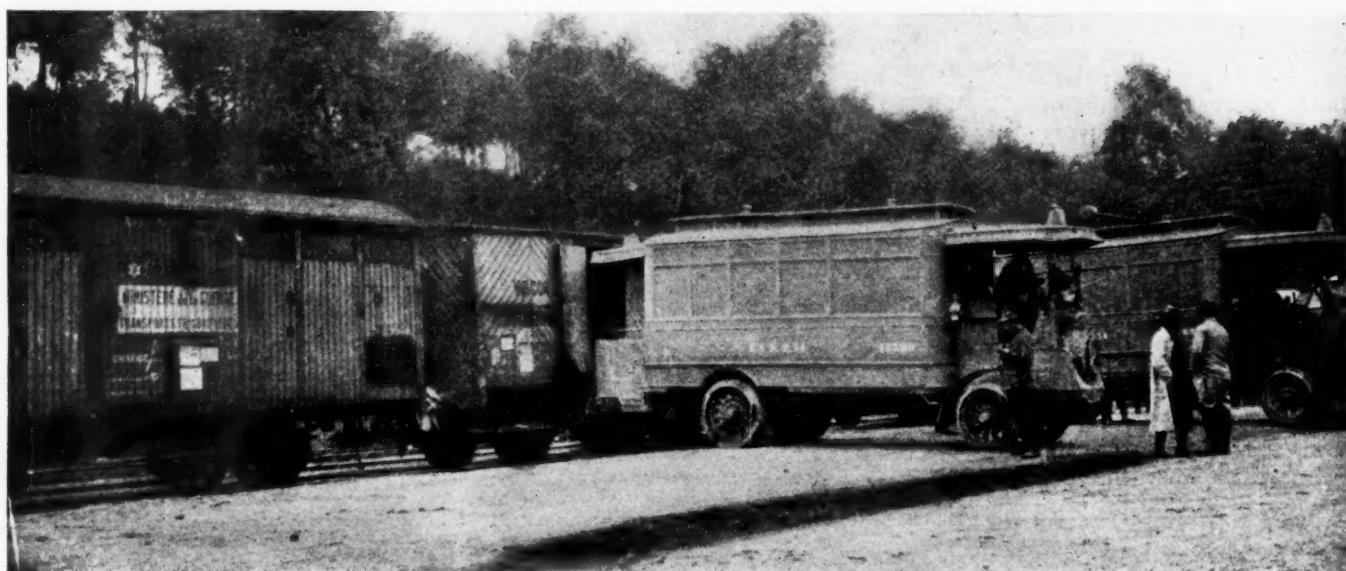
"For example, we need nitrate and copper from Chile. These are essential to the production of munitions of war. We may, however, procure this nitrate and copper by shipping jewelry or automobiles to Chile. Again, we need from Argentina wool, wheat and hides and these necessities may be obtained by shipping in exchange sewing machines or typewriters. Thus the manufacture of a limousine or a typewriter may be in fact the means of producing nitrate or wool.

"What may be shipped to foreign countries depends upon what they are willing to receive from us; therefore, it may be possible to secure what is needed by shipping non-essentials. Cases may arise where we must draw upon our store of much-needed raw materials and finished products in order to procure raw materials which are in even greater demand. Thus we may have to send coal or agricultural implements to Argentina in order to procure wool, wheat or hides. The extent to which we can afford to reduce our own much-needed supplies of coal and agricultural implements would depend upon the extent that we needed wool, wheat or hides. These are relative questions to be settled only after careful consideration of all the circumstances."

## The Organization of the Council of National Defense







## Buses Deliver Army's Meat

Highly Organized Service Maintains Supply from Railhead to All Points of Front

By W. F. Bradley

**A**LL meat distribution in the French army is carried out by automobiles which are either former Paris motor buses or the same type of chassis built since the war. Whether they once carried passengers in Paris or have never known anything but war service, the design and construction are the same.

The automobile meat buses take their supply daily from the army abattoirs and deliver it direct to the company. Years ago it was recognized that only by means of an automobile fleet could an army in the field be kept supplied with fresh meat under really satisfactory conditions. With horse delivery the cattle have to be kept in close proximity to the army, have to follow their every movement and be killed while in an unsatisfactory condition. If kept further in the rear, and only slaughtered when in prime condition, the distance is so great that the meat cannot be taken up to the troops at daily intervals.

Each automobile meat bus is designed to carry 1800 kilos, or 3968 pounds, suspended from hooks on a couple of longitudinal racks. As the meat ration in the French army is 500 grammes per man (1.1 pounds), each bus can carry 3600 rations. Theoretically one meat truck can carry daily enough meat for a regiment of infantry containing three battalions of 1000 men, or a total of 1 vehicle for 3000 men.

Actual figures taken from the books kept by a meat transport column in service on a portion of the French front showed that 7 meat-carrying automobiles were supplying a division of three regiments, or 16,000 men. This means that one automobile was furnishing 2300 men with two meat rations per day. The books showed that these 7 automobiles carried 218 tons of fresh meat in one month, which works out roughly at 1 ton per automobile per day, or 1 pound of meat per day for a little more than 2000 men.

This is below the theoretical capacity of the automobiles, which is one vehicle for 3000 men. The figures

are not fictitious, but those taken from the return sheets of a section on the front. The period covered was one of almost complete calm, when numbers of men were away on leave and, in consequence, the automobiles were not working to their full capacity. The same returns showed that during the French offensive on the Somme 9 automobiles supplied 75,000 men, which gives a ratio of 1 automobile for 8330 men, or a load of 8330 pounds per automobile per day.

The mileage on this occasion was 50 per day per vehicle. Although the service was maintained for some considerable time, this represents the limit of the carrying capacity and mileage of the automobile meat buses on active service. During the period of calm, when the automobiles were supplying only 2000 men per day, the daily mileage was only 15. This indicates that on an average the abattoirs are 7 to 8 miles behind the company quarters, although, of course, a considerably greater distance separates the abattoirs from the trenches, all food having to be cooked a few miles in the rear and carried to the men on the firing line by hand.

### Seven Automobiles to a Division

It is usual for a fleet of 7 meat-carrying automobiles to be attached to each division, which can roughly be considered as 16,000 to 20,000 men. This is a normal service which can be assured month after month, or even year after year without a hitch. In addition to these 7 there is an officer's touring car, used by the lieutenant in charge of the section, a motorcycle for the dispatch rider, and one service or repair truck not equipped with anything more elaborate than a good set of hand tools.

Several meat-carrying sections were visited on the French front during August, 1917, which had been on active service since August, 1914, or 3 full years. Without an exception these automobiles were in re-

markably good mechanical condition. They were war stained and had long lost their original polish under successive coats of army gray, but every mechanical organ was spotlessly clean and not a single pin or bearing had failed to receive attention and oiling at appropriate intervals. In a large measure the excellent mechanical condition of the automobiles is due to the fact that when these vehicles left Paris in August, 1914, they were in charge of the men who had handled them on the city streets, and these same men had been retained. Every man thus took a personal interest in his bus, and made it a point to keep it out of the repair shops.

Details often indicate the general tendency. Thus, these motors are carried under the driver's feet, in which position there is tendency for mud and water to find its way onto the power plant. Every driver had made a housing for his magneto, the protection being of wood, metal, or leather, according to the degree of skill of the driver or the material at his disposal. Every engine was spotlessly clean, carbureter and ignition control connections free from play, there were no oil or water leaks, fan belts were correctly adjusted, and on one corner of the engine base the driver had a small can to hold kerosene for cleaning purposes. The same thoroughness was to be found in the steering and brake connections, all working parts being free from dirt, and obviously oiled or greased every day. These remarks apply to sections which were in regular service, having been on the road the previous day and prepared to go out the following morning.

Every month or six weeks, according to military circumstances, each automobile is taken off service and turned over to the two mechanics in charge of the section, who examine it carefully and carry out all running repairs.



Preparing to tear down a Pierce-Arrow truck engine in a French mobile repair shop

Once a year, on an average, each vehicle is sent to its groupement repair shop for a complete overhaul. This mobile repair establishment, being provided with power-driven lathe, milling machine, drill presses, tire press, etc., takes down motor, gearset and rear axle, examines and repairs all the units, assembles and tests the vehicle. The solid tires are renewed at this operation, if necessary. With such a system—individual care on the part of interested drivers, a monthly examination by mechanics, and a yearly overhaul—the life of the automobiles is lengthened to such an extent that after 3 years' steady war service over all kinds of roads, and remaining in the open 365 days of the year, the vehicles are, mechanically, as good as new at the end of three years.

#### The Bus Details

Two types of meat-carrying automobiles, very similar in general design, are used on the French front. One is a De Dion-Bouton omnibus chassis and the other a Schneider. Cylinder dimensions of the former are 110 x 150 mm., and of the latter 125 x 140 mm. Both have four separate cylinders governed to 1000 and 900 r.p.m. respectively, at which speed the road speed is 14

(Continued on page 935)



How tire stocks are kept near the front in parked trailers



# Industrial Peace—First Essential in Winning War

British Labor, Nearly All Union, Voluntarily Abandoned Strikes and All Union Privileges for Duration of War—Has Stood Nobly by Terms of Agreement Made in 1915—Women Do 80 Per Cent of Munition Making—America's Labor Problem Similar in Many Ways, Different in Others

By Sir Stephenson Kent, K. C. B.

Director General, Labor Supply Department, British Ministry of Munitions

*AT the request of Secretary of War Baker a deputation from the British Ministry of Munitions has been relating to groups of American business men how Great Britain handled the enormous labor problem which arose with the realization in 1914 that England was hopelessly deficient in all munitions of war. Under the leadership of Sir Stephenson Kent the deputation first consulted with the Government and were then asked to tour the country so as to circulate widely the valuable information they possessed. The mission was not advisory, it merely came to tell a story and to answer questions. Speaking to the Editorial Conference, a body consisting of the editors of all America's leading business papers, in New York, Nov. 13, Sir Stephenson Kent gave a complete and concise summary of the British situation, which follows hereunder.—EDITOR.*

I gather that you will expect me to once more expound the gospel we have come here to preach. I may say that we have been doing that for the matter of a month or more traveling round your enormous country, and gradually appreciating that we have seen practically nothing of it. I think the impression we all have is that it is so vast that if we stopped here the rest of our lives, we really should know very little more about it than we do to-day.

Your problems and ours differ. We appreciated that at a very early moment after our arrival in this country; and anything that I or my colleagues may say, I beg that you will take not as advice or suggestions, but simply as a recitation of the experiences that we have had in England.

We recognized in England, after our first few months' very bitter experiences, that the organization of a nation's industries on a war basis is even more important than having an army. The army is as helpless as a baby in its cradle if there is not organization of the industries and if the munitions that are absolutely vital to the success of that army are not forthcoming, and forthcoming without interruption. Continuity of supply and an

ever-increasing supply are vital to the success of the army at the front.

Industrial peace at home is a necessary accessory to the success of your army; without it, it is never going to dare to move. My government called together, before the Ministry of Munitions existed, capital and labor, federations of employers and the heads, the executive chiefs, of our trade unions. We differ from you in that respect. The labor that is engaged principally in the engineering trade, in the manufacture of munitions, in its widest sense, is very highly organized. The percentage of trade unionism there is very great indeed. I think it is no exaggeration to say that in the engineering trade 80 per cent of the labor is trade union labor.

My government had two ideal bodies to negotiate with: The committees of these federations of employers, who were fully representative of capital's voice, the trade unions officials, who fully represented labor's voice.

That conference ended in what is known as the Treasury Agreement. That Treasury Agreement was embodied in the Munitions of War Act. The principal features that I am to worry you with in regard to that act are as follows:

## Profits Limited

In the first place, the Minister of Munitions definitely had power and definitely limited the profit made in any establishment that was engaged in the manufacture of munitions.

In the second place, the wage of the labor in those controlled establishments was fixed; it was made quite clear to the trade union heads and to labor generally that there would be no fluctuation or variation in the wages of that labor, except by express consent of the Minister of Munitions, and that he would not give his consent to any such variation unless an overwhelming case was made to him.

The state then having fixed the profit and fixed the wage, and capital and labor and the government having definitely agreed on the principle which, I think, is essential, that a nation's need is not the opportunity for capital or for labor to make money out of its country, having

done that, the state realized its duty in regard to the labor, whose wage it had limited.

The Committee on Production was set up, whose function it was to ascertain what, if any, the increased cost of living amounted to and to issue a national award in regard to that labor whose wage had been fixed, so as to meet the increase in the necessities of life that that labor might find. That committee meets three times in a year and has the necessary statistics laid before it, receives representations from trade unions and from any one else who has a voice or should have a voice in the matter, investigates the case very carefully, then gives instructions that this labor should receive so much extra per week to meet that increased cost. That is paid by the employer and is recoverable by the employer from the state. It is the state's charge.

### Strikes Illegal

The third point was the illegality of strikes and lockouts and compulsory arbitration. The same principles underlay that. In peace time a lockout or a strike was a matter between the employer and his employees; in war time it is a matter of national concern. If, through obstinacy on the part of the employer or his employees, a factory which the army was very largely dependent upon for some very definite and urgent munitions remained out of work for some period, the state could not tolerate that in war time; and so, in this Act, it was laid down that any lockout or strike is illegal, and if any one incited the men to go out on strike, or if the employer deliberately locked out his employees, the maximum penalty for any such offense is penal servitude for life.

My government induced, it required very little inducement, the trade union leaders in my country to agree to waive all the restrictive practices that had been common in the manufacture, on the civil side (what now is the munition side) from the point of view of output or from engagement of labor on war work, for the period of the war. On the government's side it pledged itself to restore the pre-war conditions in any factory where by that agreement the normal conditions had been varied.

Those, I think, are the principal features of that act. The act has, on the whole, worked well. We have had stoppages, we have had strikes, but they have not been of very great length or of very serious moment. And I think, if you take into consideration the very long period of strain that our workmen have suffered under, it is a very surprising thing. You must remember that in the early days of the Ministry of Munitions we worked these employees in these factories hours that are really disgraceful—I know no better word—one hundred and twenty hours in the week in some establishments. A hundred hours was quite common. That went on for a period of some months. All their holidays, their normal pleasures, the relaxations, horse racing, football, and so on, were all wiped away. These men were required to work and to forget that they were in the world to try and get any little pleasure out of life.

### Guarding Against Disaffection

That being the case, after all this long period, it will be, I think, easily appreciated that because of war-weariness, a state of mentality that is very apt to magnify grievances, any little, tiny, grievance becomes a matter of very great importance. It is a very fruitful soil for the pacifist, for the professional agitator, for the I. W. W. and so on to work on. And I think that it redounds enormously to the credit of our labor that we have managed to get through with this continued industrial peace. (Applause.)

The Ministry of Munitions set up in the ministry a

labor side, of which I have the honor to be the head; and to that labor side is given the solving of all the problems that deal with labor. They are dealt with on a policy that is laid down by the Minister of Munitions or the government, as the case may be, from time to time.

*These matters are not left to the individual employer to deal with as he thinks fit. We do not permit one employer to settle some little dispute in one way, another employer a similar dispute in another way. We try and get some definite, broad policy laid down, and then deal with these matters on that policy throughout the country.*

We look upon it as our business, and we have a very considerable staff, whose duty it is to act as the eyes and ears of the Minister of Munitions. It is their function to know of any possible cause of dissension in any industrial center in the country, and to deal with that cause of dissension before it becomes a dispute.

*We have the theory that in war time prevention is one million times better than cure, and we look upon it as our duty to prevent the possibilities of dispute even arising.* We have, to a certain extent, been successful, but it is a very arduous business to-day, because of that state of mentality to which I referred.

It is so very easy for what appears to be a point of no importance whatsoever to suddenly become a sort of fiery cross to the whole of my country. And so these eyes and ears, these officers of the Ministry, are a very essential part of our administrative machine.

### Universal Economy

We take the view that to-day, above all other times, it is absolutely vital to exercise economy from every point of view. Economy from the point of view of food—yes; and economy from the point of view of the materials that are essential to the winning of this war, economy from the point of view of the use of man-power.

We look upon it to-day in England as a very serious crime if steel or copper or lead or iron or any of these raw materials which we never have a sufficiency of is used for any purpose other than to help to win the war. We look upon the employer or the army or a government department who misuses the skill of any mechanic or any citizen really as a mistake and a crime, and something that it is our duty to put right.

We have a great number of technical civil engineers of the highest qualifications, whose duty it is to investigate the use made of man-power in these establishments. They report to the Minister of Munitions, and if they find any employer having in his employ a skilled workman, and that that skilled workman is doing work that somebody who possesses less skill could do, we take very serious note of it, and move him on to some better work, work that he should more properly be performing.

That, with us, is absolutely vital, and I think, if I may say so, that you, in no very long period of time, will also find it vital. This war is primarily a war of mechanics. There is no country that is to-day at war that has a sufficiency of skilled mechanics. We are all lamentably short of skilled mechanics.

If you will remember that to-day every gun that we manufacture and send to our army, with that gun we have to send some small number of skilled mechanics; that with every airplane a very great number of mechanics, and so it goes with every conceivable article of munitions that we send to the army, we have to deplete the skilled man-power that remains to use in our country.

The better we supply the army, the more difficult our problem at home becomes. And so with you exactly the same problem must arise; and I understand again that one of my colleagues is going to elaborate and give you details on that point.



We had an experience that I gather you are having at the moment, and that is the migration of labor, the enticement of labor. We called it the auctioneering of labor. In the early days our employers were loyally anxious to do everything they could to assist the government in getting the biggest output of munitions that was securable at the earliest possible moment. And I think they thought that it would be of assistance to the country if they accumulated as large a number of skilled mechanics as they could in their establishment; that they would then be ready to take on any order that the government might like to entrust to them.

### Creates Unrest

Of course, any such experience as that, any such habit as that, is a very dangerous one. It leads very rapidly to one of the most vicious circumstances that one can picture. The man whose labor is being taken from him has proceeded to rob somebody else; and so it goes, and there is no finality in it. You get unrest of the worst description among your labor. They are always looking round the country to see if they can't find some other employer who will offer them a still higher wage than they are at that moment receiving.

You find that the government attaches the greatest possible importance to the output of a certain type of munitions. Some employer will be doing his best to get that labor that is engaged on that output away from that particular factory onto something of less importance, and it is a picture. We experienced it in the very early days; it leads to a picture of chaos and mismanagement and general stupidities that are very difficult to overcome.

We dealt with that under our very convenient instrument that we have in England which is called the Defense of the Realm Act. Under that act the Minister of Munitions and a great number of our government officers can draft a regulation which he thinks necessary and publish it and for the time being it becomes the law of the land.

### Offense to Alienate Competitor's Labor

We made it an offense for any employer in the engineering industry to offer inducement to labor engaged on a similar class of work. We also gave the Minister of Munitions power to restrict and regulate the employment of labor in any establishment. If the Minister was dissatisfied with the way any employer was either handling his labor, or was making use of his labor, or generally, he had the power to lay an embargo on the engagement

of labor in that particular firm: a very valuable Big Stick. It brought things to some sort of state of order, and to-day we have no trouble from that point of view. In fact, one may say that wages are stabilized, occupation is stable; that we have more or less solved that particular problem. I say it with all reserve, because if there is one thing the war has taught me it is to give no pledge and to make no prophesy. Nobody knows what is going to happen to-morrow.

### Business in Government

Talking to our chairman at lunch, I made the remark that I had and still have the greatest possible abhorrence of public life. I had always made it a pledge to myself and to a great number of other people that nothing in the wide world would ever induce me to enter public life or to make any sort of public appearance anywhere. I find myself in America doing nothing else. (Laughter.)

Well, that is the war. The war has brought that about. Certainly had my country remained at peace, nothing in the wide world would have brought it about.

I then proceeded to say to him: "If we do that in war time, why don't we do something for our country in peace time?" And he asked me to make mention of that.

*I do think it is an old truism—and this does not apply to your country or to my own, but the people have the government they deserve, and I do think (I am a business man when we are at peace) that the business communities of the world have got to take a bigger interest in their government in peace time and not leave it till war time in future.* (Applause.)

### Labor Super-Important

In conclusion: It is absolutely impossible to exaggerate the importance, the overwhelming importance that labor plays in war. Without labor, without that industrial peace of which I spoke, this war cannot be won. It is the basis of the war. Your man-power at the front, your man-power at home, all turns on labor's activities and the solution of the problems that war brings in regard to labor.

I want to also say this: That on the solution, on your solution, of the problems with which you are faced, a great deal depends in my country, too. Should you fail to solve those problems, it will react, and react very seriously, in England; and we look to you with a great deal of confidence. I think we appreciate how enormous those problems are, but we are happy that you will solve them and solve them on the right lines. (Applause.)

## Few and Small Changes Made in Class B War Truck —Class C Progressing

**A** FEW changes have been made in the Class B military truck as a result of the testing now in progress. The rear wheels are to be 40 in. diameter, so as to increase the clearance over the brake drums, which will add a tire size to the stock to be carried. This really does not mean another tire to be stocked, as the use of wide single tires would have necessitated a section only good for the rear wheels of Class B.

Work is being carried out on a new carbureter which will be special. A small committee of carbureter men have evolved and tried out a design which includes no patented features whatever, and the preliminary results

are said to be very good. For transferring gasoline from the reserve tank located under the seat to the dash tank a hand pump is to be fitted.

The design of the ¾-ton truck is proceeding. This will be used by all departments of the army and also by the post office. It is not expected to be ready for some considerable time, as the requirements to be satisfied are so varied. The work, under General Baker's direction, is being handled by H. T. Thomas, chief engineer of the Reo Motor Car Co.; B. F. Wright, chief engineer of the Federal Motor Truck Co., and C. T. Myers, consulting engineer.

# Class A Truck Ready December 10

Has Internal-Gear Axle—Otherwise Mainly Scaled Down Class B Design—  
Engine Built in Sixteen Days Shows Good Power

By A. Ludlow Clayden

**O**UTWARDLY the Class A military truck differs very little from the larger model, except that it has an internal-gear rear axle. In other respects it is the Class B chassis scaled down to less than two-thirds the weight. Three experimental chassis are to be built, orders for them having been placed Nov. 17 with the Autocar Co., the White Co., and the Denby Motor Truck Co. The scheduled dates for the completion of these vehicles is Dec. 10.

A new record has been set up in the production of the engine which is now being tested in Detroit. Owing to difference in size, only very few parts could be used which were identical with those of the Class B engine, so a complete new set of drawings had to be made, new dies cut, new patterns made, and so on. From the time this work was started till the engine was turning over in the Continental Motor Co. plant exactly 16 days and 20 hours elapsed. The power, and especially the torque, obtained from the motor enable it to rank with the Class B as a highly successful product. At the governed speed of 1200 r.p.m. the power is 42½ hp., and at 900 the torque reaches its maximum of 198 lb.-ft.

## Has Mushroom Tappets

The engine is 4¼ by 5½ in., 312 cu. in., and it differs in design from the Class B mainly in having the four cylinders in one block and by having mushroom tappets instead of the roller type. The detachable cylinder heads cover only two cylinders each, thus being exactly like the Class B, except for size. This division of the head casting into two is excellent practice, because the smaller piece is so much easier to handle when carbon scraping becomes necessary.

The valves are large in proportion to the cylinder bore, being 1⅞ in., measured in the clear across the port, and the timing is as follows:

Exhaust opens 45 deg. early.

Exhaust closes 5 deg. late.

Intake opens 15 deg. late.

Intake closes 38 deg. late.

The valve lift is 5/16 in. for both the intakes and the exhausts.

The manifold layout is precisely that of the Class B, this having proved itself one of the best features of the larger truck. The same is true of all the accessories, ignition, generator, etc., and of the method of mounting in the frame. The crankshaft is 2¼ in. diameter throughout, has three bearings, and is otherwise like the larger job. A slight point of difference, due to the block cylinder casting, is that the water pump delivers to a single opening instead of to two on the cylinders. Also the fan bracket is attached to the front of the cylinder block instead of to the crankcase. There is an offset on the connecting rods of ¼ in., this allowing the motor to be shortened. Cooling is varied to suit the smaller engine by cutting down the altitude of the radiator 4½ in., using the same top and bottom cast tanks. The reduced length and height give the front of the truck a very compact look.

The clutch takes the same disks as the Class B, but has fewer of them—14 surfaces as against 18. It is inclosed in the same way, and the gear control with the brake lever, which mounts on the bell housing, is identical with the Class B part.

## Transmission Like Class B

Similarly the transmission looks just like the Class B, only smaller. It has four speeds, and is hung in the frame the same way, with a slight difference at the rear. The back end of the aluminum case is machined on a circle like the face of a bell housing, and a steel-forged ring is bolted thereto. On this forging are the lugs through which the frame attachment bolts pass and also the anchorage for a transmission brake. This is an extremely clever piece of design, because it insures absolute concentricity between the brake and its drum, while no braking stresses can possibly be put upon the transmission case, since they pass directly from the brake shoes to the frame via the steel ring. The brake is a very powerful one, 7 in. diameter and 6 in. wide. It has two external shoes contracted by a cam action, similarly to the brake used on the Riker truck. The shoes are easy to remove for relining and equally easy to adjust for wear. Between transmission and engine there is a universal shaft, and this is inclined a little, the transmission is tilted a little to correspond, with the object of dividing up the angularity between the two joints in front of the transmission and the two back of it in equal ratio.

## Entirely New Axle

It has already been stated that the rear axle is internal-gear driven. It is, however, an entirely new design, and appears to be one of the neatest. It is not heavy, the brakes are completely protected from lubricant that might escape from the gear, and the accessibility of its details is remarkable.

The weight-carrying member is a pressed-steel "banjo" with steel tubes forced into the ends, very much like the regular Timken passenger-car axle. At each end the steel spring tables are rigidly attached, and these carry the driving pinion bearings and the brake anchorage.

Behind the pressed-steel case is the differential, this being carried in a steel casting which is inserted from the front of the pressed-steel part. This casting holds the bevel pinion and all the bearings. A light cover, removable from the back, incloses the whole assembly. The differential can be removed from the rear without disturbing the bevel pinion, or the whole drive-gear assembly can be taken out from the front without tearing down the axle. After taking off the road wheels the driveshafts can be withdrawn, as they fit into the differential on splines.

It is not easy to explain the way in which grease is kept from the brakes without a photograph of the axle, which is not yet available. The hub is a casting, and has bolted to it by the same ring of bolts both the ring gear and the brake drum. The latter is much larger



in diameter than the gear, and much deeper, so it completely covers the drive. The gearing is inclosed as tightly as possible, and is nearer to the wheel than the brake. The drum has its largest diameter right in line with the joint in the gear casing, being smaller on the actual brake surface, and this gives a sort of annular pocket back of the brake which would catch any lubricant exuded from the gear. A ring of holes is drilled to allow escape of any such grease or oil. Any which gets out of the gear will be flung to the largest diameter of the drum by centrifugal action, and hence it will be thrown off outside the brake.

Naturally, the gear ratios are a little higher than on the heavier truck. The direct drive is 8.4 to 1, the others being respectively 14.3, 32.4, and 42.5 to 1. Tires are 36 by 7 rear and 36 by 4 front.

As on the B, Hotchkiss drive is used, the rear springs being 56 in. long and the front ones 42 in. Both are divided in the center. There is a new system of spring-bolt lubrication, somewhat simpler than that used on the Class B. The spring eye is bushed, the shackles and brackets are also bushed, and instead of the usual spring bolt a piece of steel tube is pushed in, free to turn either in the spring eye or in the shackle. This is prevented from endwise movement by a small bolt which goes right through and clamps the whole together.

On the inner end this bolt secures a plain cap, sealing the end of the tube, but on the outer end the bolt holds up a little oil box. This is a casting with a small reservoir below the level of the spring eye, and there is a small splash plate above, the idea being that oil will be thrown up by vibration on to the plate, whence it runs into the spring-supporting tube, and so to the bearing surfaces. Overfilling the reservoir will flush the whole unit, washing out dirt and old oil. This is the sort of thing that in normal times would be patented, and marketed as an accessory, and is an excellent sample of how several engineers getting together can perfect a detail.

There is little else about the truck which is different from the large one. It has all the same equipment, the same fuel feed from a dashboard tank, the same steering—scaled down, of course—the same frame design. It will not have the four-man seat, only two men being carried. The wheelbase, by the way, is 144 in.

The work of the design has been carried out under the direction of General Baker by B. B. Bachman, chief engineer of the Autocar Co.; E. E. Wemp, chief engineer Denby Motor Truck Co., and A. J. Scaife, chief engineer White Co. For the detail working out of the engine W. A. Frederick, Continental Motors Co., was responsible.

## Dodge Issues Light Commercial Car

Specifications Similar to Standard Passenger Vehicle—Designed to Carry Loads of 1,000 to 1,500 Pounds

**A**S announced exclusively in the Feb. 2, 1917, issue of AUTOMOTIVE INDUSTRIES, Dodge Brothers were preparing to market a light commercial car, and the first of these are now being placed in the hands of its dealers.

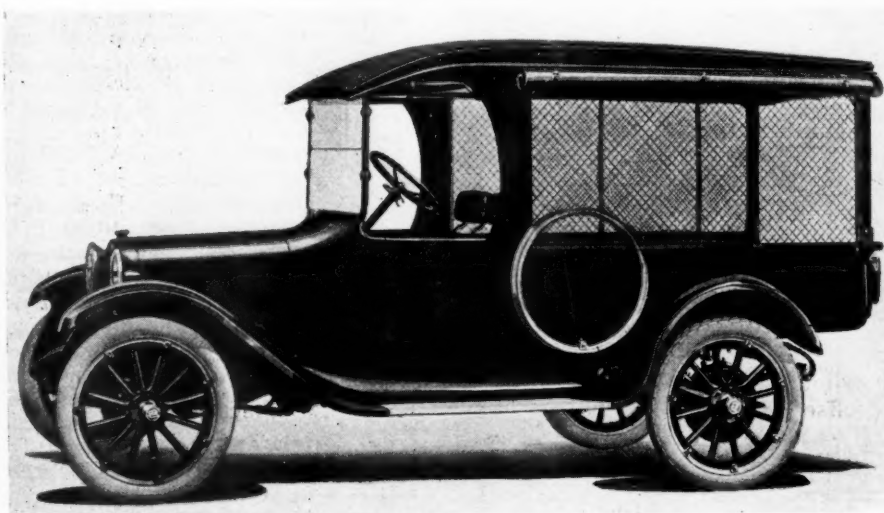
The specifications are similar to those of the standard passenger car, except that various parts have been strengthened as necessitated by the increased load. Designed to carry a maximum load of from 1000 to 1500 lb., the springs have been made stronger, the tires are 33 x 4 in. all around, plain tread front and non-skid rear, and the steering knuckles, etc., have been strengthened.

Among other changes noted on the truck is that the gasoline tank is placed beneath the driver's seat, and the steering wheel has been set at a higher angle to give a greater loading space. The frame has been strengthened and lengthened

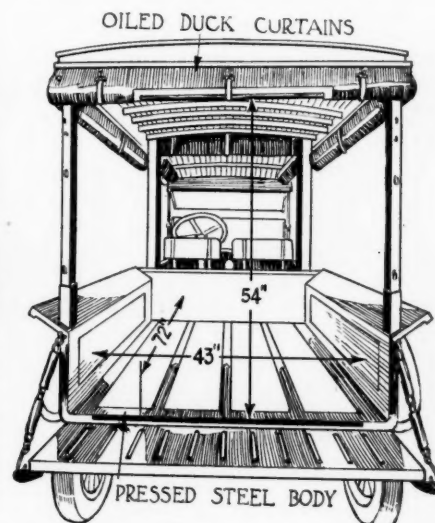
so that a loading space of 72 by 43 in. is obtained back of the driver's seat—a large amount for the wheelbase of 114 in., which is the same as the passenger car. The clutch on the commercial car is dry plate disk, with ball-bearing release mechanism, and the gear ratio is 4 to 1.

The body is especially well designed to meet the varied requirements of a light commercial car. Departing from the usual practice, it is of pressed steel throughout, and of the express type with a permanent top and cab measuring 54 in. from the floor of the loading space to the inside of the top. Steel wire screen sides are supplied that may be removed if desired, and substantial oiled duck curtains are provided for completely inclosing the car.

In the main, the balance of the specifications are the same as the passenger car, and the finish is a similar black enamel.



The new Dodge Brothers light delivery car has a pressed steel body which may be entirely enclosed with curtains



There is plenty of room for a variety of uses

# Schebler Has Plain Tube Carbureter

Novel Principle Used to Insure Proportionality of Air and Fuel Throughout Working Range—First Model to Be for Ford Cars

**T**HE Wheeler-Schebler Carbureter Co., Indianapolis, Ind., has brought out a new plain tube type of carbureter. The first model made is for Ford cars, and others of the same design will follow after tests on various sizes of horizontal and vertical types have been completed.

As will be seen from the sectional drawing herewith, the new Model A incorporates a downstream Pitot tube which acts as the impelling means to drive fuel out of a reserve well so that it will automatically furnish a rich mixture for acceleration and a leaner mixture after the normal motor speed has been reached. The venturi of the Ford type is horizontal, with the main jet opening at the restricted part. The idle passes transversely across it in a vertical direction, and discharges above the throttle regulated in the customary way by a needle valve with a knurled screw *A* which regulates the idling and low speed mixture.

## To Break Surface Tension

The theory of operation is that gasoline and air obey the same laws of flow; therefore, if they are started at a common zero the flow of fuel out of a nozzle inserted in and caused by a flow of air through a pipe or venturi will remain directly proportional. However, fuel in the liquid state does not flow until considerable head is produced, due to surface tension or capillarity. In order to break this tension or holding of the fuel in the jet, the high vacuum above the throttle is utilized. (See diagram.)

Air flows into and through the choke or venturi tube in the direction of the arrow, but for idling speeds the velocity is too low to cause suction enough to break the surface tension at the main nozzle *A*. An extension is provided from the main nozzle to the engine side of the throttle, the size of this passage being controlled at the point *B*.

In operation, the high suction above the throttle breaks the surface tension in the main nozzle and causes fuel to flow through

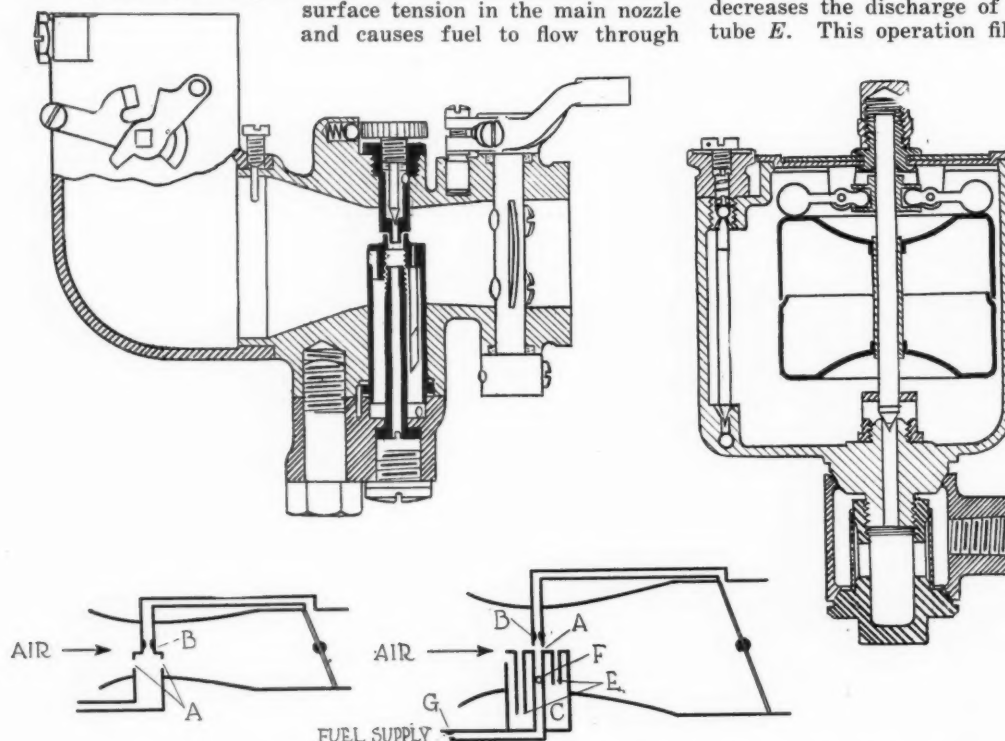
the extension, together with some air, which is drawn in through the main nozzle holes *A*. By means of the adjustment *B* the flow rate can be made to equal that which would be taken out of *A*, if surface tension were eliminated. As the throttle is opened the increasing suction at the main nozzle cuts down the air bleed through the holes *A* and causes more fuel to pass through the extension, until the suction caused by the flow of air at main nozzle *A* equals the decreasing static suction above the throttle. Fuel then comes out of the main nozzle holes *A* into the main air stream. This also probably causes a slight reversal of flow in the extension passage. This combination produces a correct proportion of air and fuel through a very large range if the throttle is not suddenly thrown wide open from its closed position. When this happens the motor would lay down or miss six or seven shots and sometimes die completely. To overcome this trouble an overflow well or reserve chamber *C* is formed around the main fuel passage, whose top is integral with the main nozzle head and provided with a downstream Pitot. From this head two acceleration tubes extend to different depths into the overflow well and discharge into the main air stream.

## Action When Idling

With the motor idling or running slowly the well *C* will fill up by means of the hole *F* in the main nozzle passage. Upon suddenly throwing the throttle wide open the reserve supply of fuel is taken out from the acceleration tubes *E* as well as from the main jet *A*. This practically makes a temporarily large jet or nozzle until one of the tubes *E* is uncovered by the lowering of the fuel level in the well. Air is then drawn out through this tube and acts in opposition to the supply of air from the Pitot. This opposition causes a gradually increasing suction in the well *C* and uniformly decreases the discharge of fuel therefrom out of the longer tube *E*. This operation fills in the time element necessary for the main jet to resume its normal function of delivering a thin mixture. The tubes *E* are also made of varying lengths to hold a reserve supply of fuel in the well from some intermediate speed of, say, 15 m.p.h.

The Pitot function is simply to provide air at sufficient pressure to force the fuel from the well. It so happens that in a stream of air the pressure head due to velocity is negative and exactly equal to the positive impact head due to the same velocity; therefore, the Pitot hole, facing downstream, delivers air to the well at or near atmospheric pressure.

All the fuel passes through the main adjustment *G*, which is located at the float bowl and therefore controls the whole range of the carbureter, while still allowing the idle or low-speed adjustment to be changed with the condition of the motor or variations in motors of the same design.

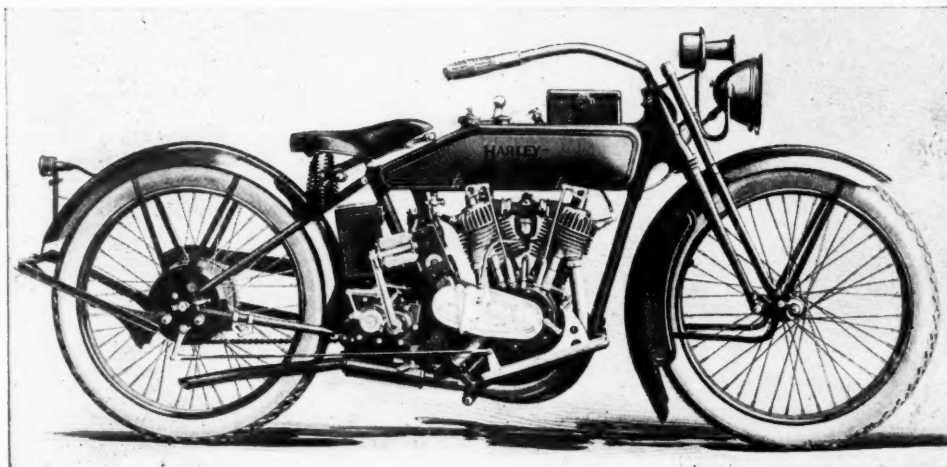


Sectional view through the new Schebler plain tube carbureter for Ford cars and diagram illustrating the Pitot-tube theory



# The Harley-Davidson Motorcycle

Has High-Speed Engine Developing 17.5 Hp. at 3000 R. P. M.—Three Speed Gearbox, Step Starter and Full Electric Equipment — Gear and Clutch Interlocked



*Harley-Davidson motorcycle with two-cylinder engine and three-speed transmission*

**T**HERE is little doubt that the American motorcycle industry will receive a great impetus from the war. It has been estimated that for every million men going into the trenches at least twenty thousand motorcycles will be required. The prospects therefore are that for the next few years most of the established motorcycle factories will be working largely on Government orders. However, private business will not be neglected and if the combined demand of the public and the Government should exceed the present capacity of the plants, additions will be made to take care of it. In fact such additions are already under way.

One of the oldest and largest firms in the American motorcycle industry is the Harley-Davidson Motor Co. of Milwaukee, Wis. While the firm manufactures a single cylinder machine in limited numbers, its chief product is a two-cylinder type which is furnished in three different models, model 18-E at \$275 being direct geared (no change gear); model 18-F at \$290 having a three-speed gear box and magneto ignition and model 18-J at \$320 having a three-speed gear box and complete electrical equipment. These motorcycles are adapted to have either a passenger sidecar or a parcel car attached and these sidecars and parcel cars are also manufactured by the Harley-Davidson company.

## Cylinders Set at 45 Deg. Angle

The two-cylinder engine has its cylinders set at an angle of 45 deg. with each other, this angle being chosen in order to facilitate the placing of the engine inside the frame. Cylinders and cylinder heads are in one piece, with integral cooling flanges. The exhaust valves are located inside pockets and the inlet valves in cages over the exhausts. The cylinder bore is  $3 \frac{5}{16}$  in. and the stroke  $3 \frac{1}{2}$  in., which makes the piston displacement 60.34 cu. in. or slightly less than the limit of 61 cu. in. set by motorcycle racing rules.

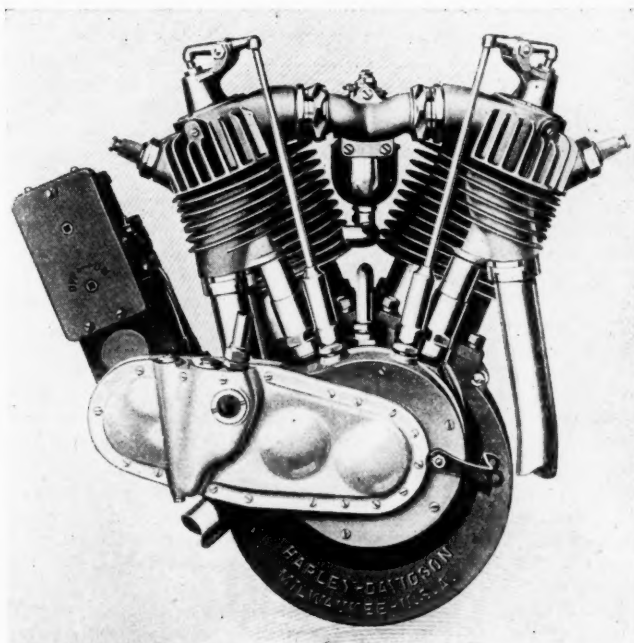
The piston is of cast iron and is provided with three compression rings all above the piston pin. There are comparatively wide bands between the rings, with the result that the piston pin axis is more than half way down the piston and the wearing surface is more evenly distributed above and below the pin than has been the case heretofore in most engines. The piston pin is hollow and hardened, and is secured in one of the piston bosses by a cotter pin inserted through

a hole in the piston skirt. The crankshaft is of the built-up type, the two flywheels being inclosed in the crankcase and the main journals and crankpin secured to them by tapered joints. A feature of the Harley-Davidson engine is that its main bearings, including the crankpin bearing and the crankshaft bearing at the power end, are roller bearings. These bearings comprise short cylindrical rollers set into cages machined out of annular rings of soft steel and they are manufactured by the Harley-Davidson company. The rollers are ground in automatic machines after hardening and the cages are first milled from one end and then have sockets formed for the rollers by means of flat-bottom drills.

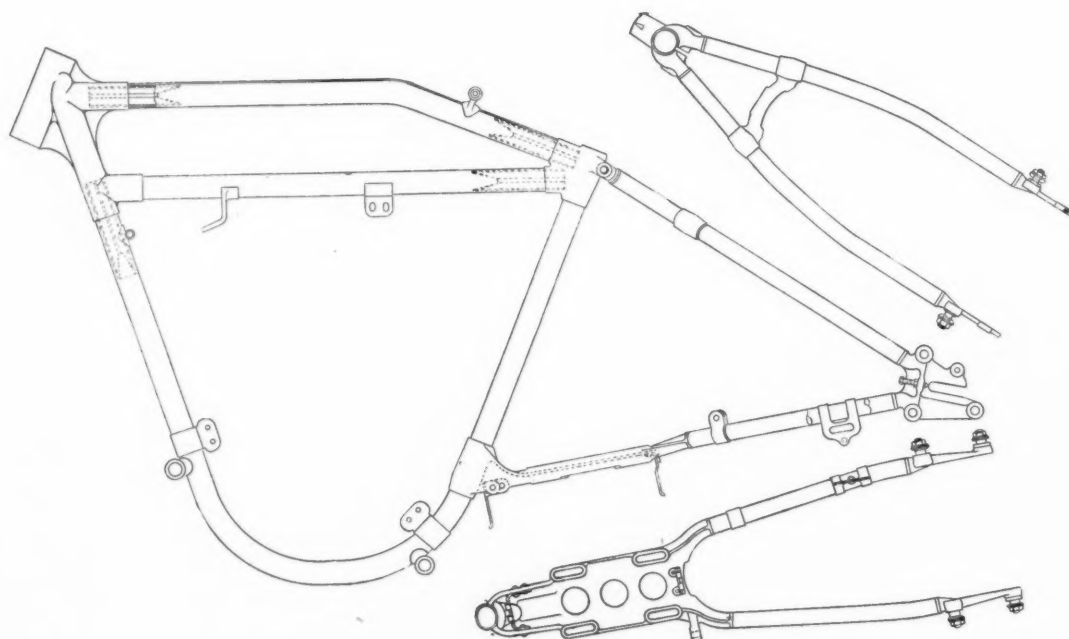
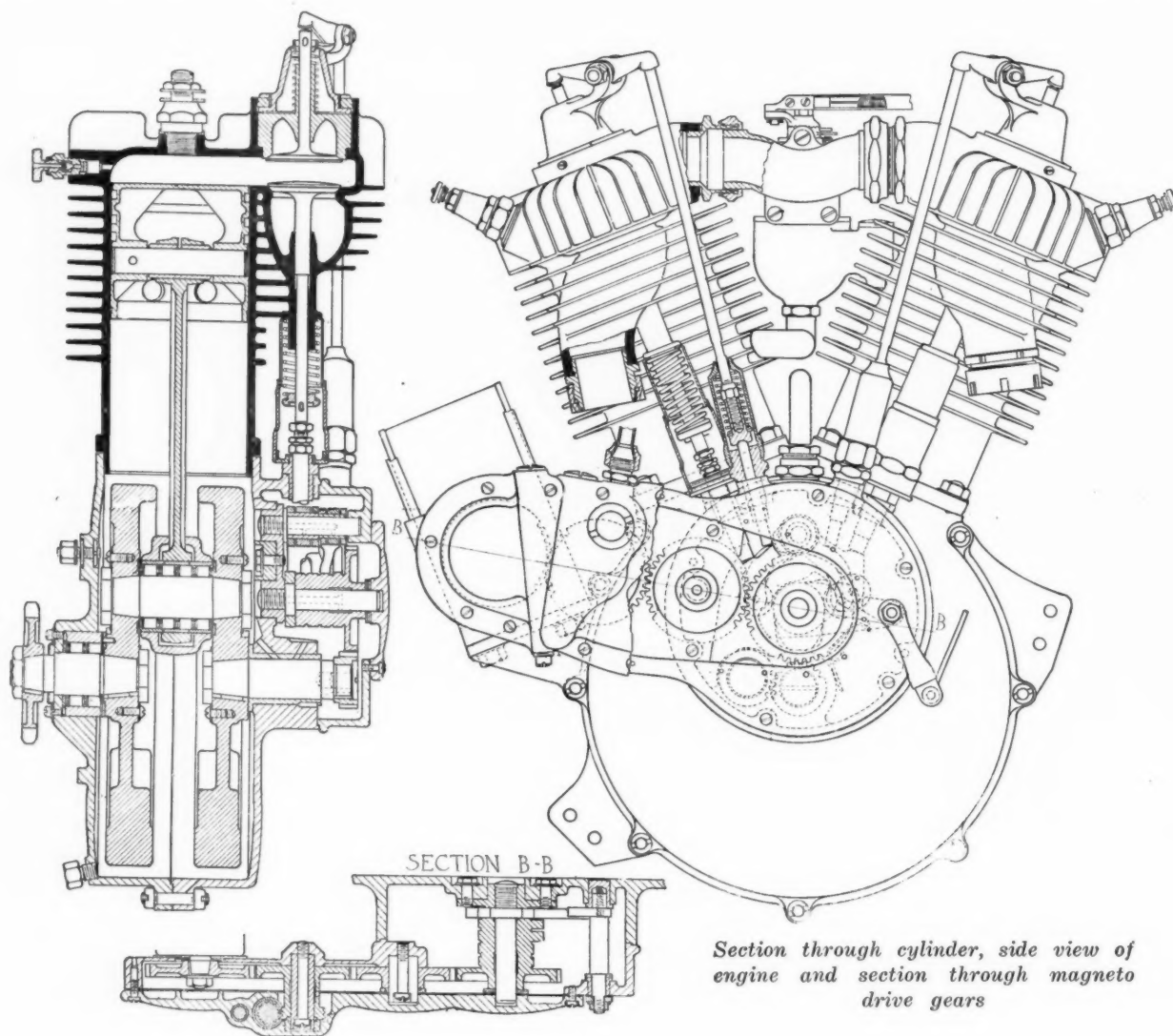
Connecting-rods are drop forgings and one of the rods is yoked, but both rods bear directly on the

crankpin, instead of one bearing on the hub of the other. At the upper end the rods are provided with bronze bushings and at the big end they are fitted with hardened steel bushings for the roller bearings. All of the journals provided with roller bearings are case-hardened.

The crankcase is made up of two aluminum castings divided in a vertical central plane and fitted together with a stepped joint. The crankshaft at one side of the engine has the driving sprocket keyed to it and at the other side it carries the cam gear pinion which meshes with a gear twice its number of teeth on the camshaft. The camshaft in this instance is a stud screwed and riveted into a steel bushing



*Harley-Davidson engine complete*

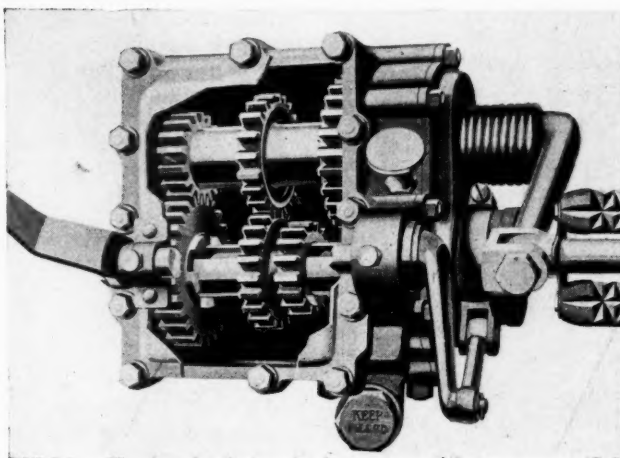


Frame construction of the Harley-Davidson motorcycle

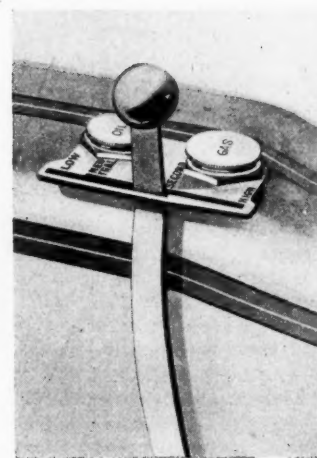


secured to the side of the crankcase, on which revolves a unit comprising the four cams and the cam gear. The cams act on rock levers provided with cam rollers at their ends. A peculiar form of cam outline is used, which results in a very unusual valve opening diagram. The valve opening diagrams, moreover, are different for the front and rear cylinders. It will be seen from the diagrams of port opening areas that the inlet valves open gradually but remain fully opened practically up to the end of the inlet stroke, whereas the exhaust valves attain practically their full opening at the beginning of the exhaust stroke and are closed very gradually. There is, moreover, a very considerable overlap of the inlet and exhaust periods, as may be seen from the valve timing diagram shown herewith. The springs of the exhaust valve are inclosed in a two part tubular cover, while the springs of the inlet valve are inclosed within the valve cages. The inlet valves are operated through the intermediary of tappets and tappet levers. There are separate springs at the lower end of the tappet rods which tend to keep the cam followers in contact with the cams.

An interesting feature of the Harley-Davidson engine is its oiling system. Oil is carried in a one gallon compartment of



Top of transmission, with part of cover broken away



Gear-lever positions

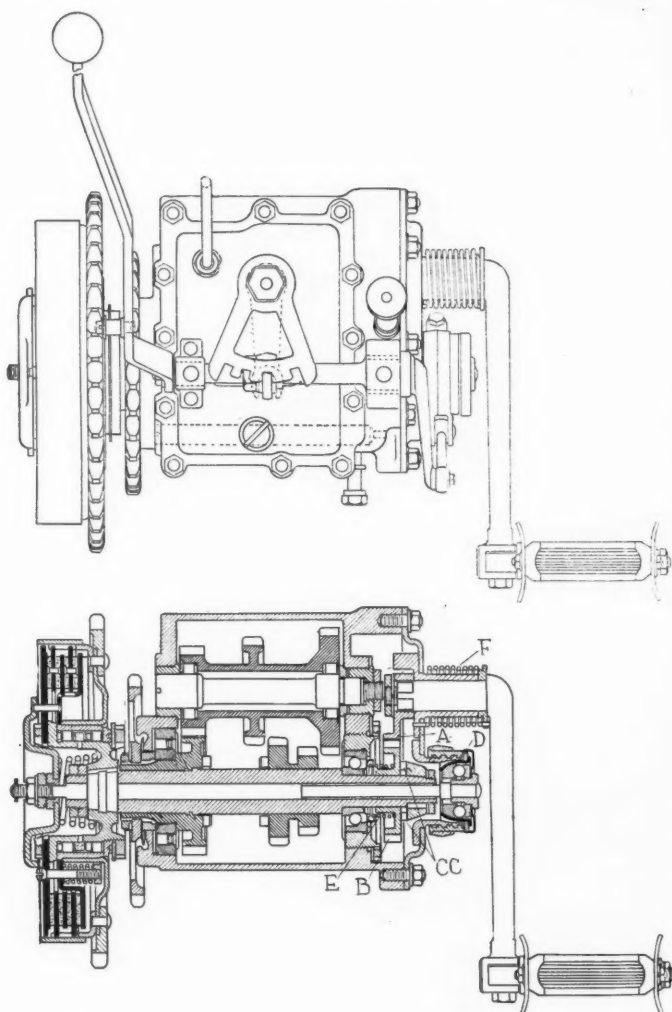
the fuel tank and fed to the engine as required by means of a plunger pump. This pump is of novel design and a cutaway view of it is shown on page 917. It is located inside the aluminum cover over the generator or magneto driving gear. Referring to the cut, face cam A lifts the pump plunger B which is then returned by spring C, thereby drawing in a charge of oil from the supply tank through pipe D. This oil passes through the pump valve H, entering it through channel E, then flowing through inlet port F, the central hole G and out through port I in the valve and through channels J and K to the pump chamber L. Just after the completion of the inlet stroke of plunger B the intake port F closes and discharge port M opens, registering with channel N. As soon as the plunger is raised by the face cam A, the oil chamber L is emptied through channels K, J, I, G, M (now opposite N) N and O into the sight feed. From the sight feed the oil flows into the engine through the opening P.

#### Lubrication Features

As the two cylinders make only a comparatively small angle with each other and the pistons work on the same crankpin, there is quite a pressure in the crankcase when the pistons are down. The pump, however, is capable of producing a much higher pressure and its feed is positive under all conditions. The oil passes through a bull's eye type of sight feed or circulation indicator, so that the amount of oil fed to the engine can at all times be observed. The oil is fed into the crankcase and the cam gear compartment, and as the feed is continuous there is, of course, always a certain amount in the crankcase, which is distributed over all interior parts by the revolving flywheels. The stroke of the oil pump plunger can be changed by varying the thickness of washers under the head of the adjusting screw R. In this way the oil feed can be adjusted. In addition to the mechanical pump described there is provided a hand pump which can be used to supply additional lubricant to the crankcase in climbing steep hills and under other unusual conditions.

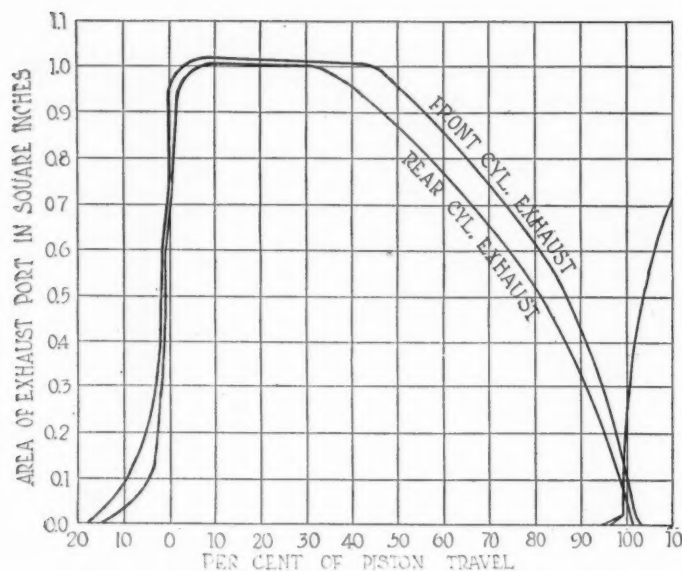
Gasoline is carried in two tanks of symmetrical streamline shape without sharp corners and exposed seams. The main gasoline tank holds 16½ pints and the reserve tank 5½ pints, making the total capacity 22 pints or 2¾ gal. The oil supply tank is combined with the gasoline tank. Large filler caps make it possible to use the ordinary garage funnel or hose in filling. Positive shut-off valves are fitted in the pipes from both tanks. The carburetor is of Schebler make and is provided with a choking valve for easy starting in cold weather. A change in the cam outline of this carburetor, recently made, insures a correct mixture at all engine speeds. In order to obviate trouble from grit, etc., in the gasoline, which is apt to be particularly bothersome with the fine nozzle openings in a motorcycle carburetor, an effective gasoline strainer is placed inside of each of the gasoline tanks.

Ignition is either by a high-tension magneto of the special motorcycle type or, in case an electric generator, is carried by a coil and battery system. The Government insists upon

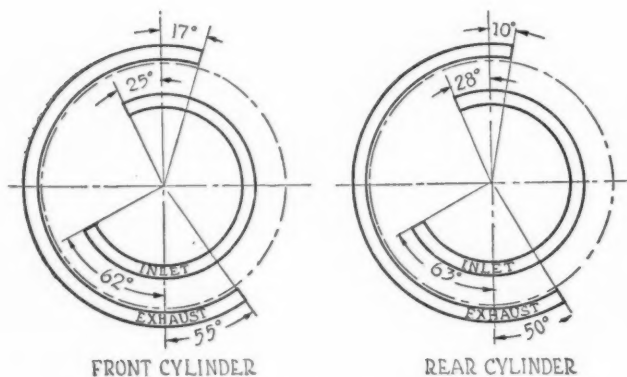


Plan view of and section through transmission, showing step starter and clutch interlock

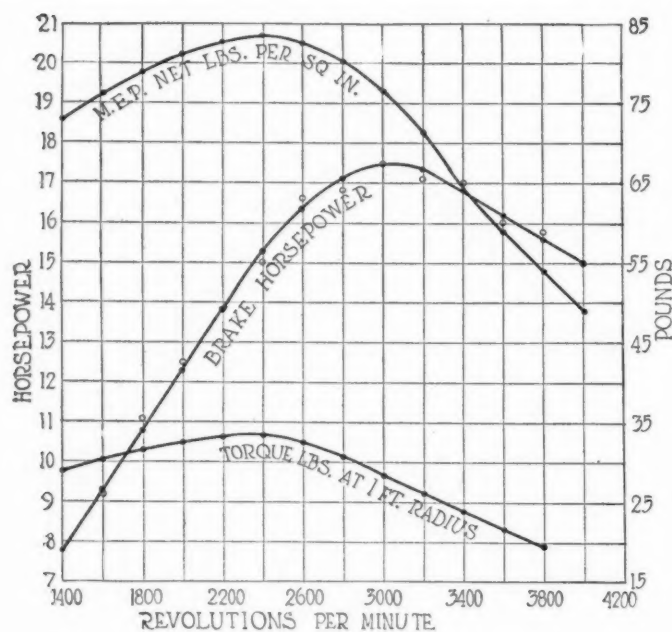
## Valve Timing and Performance Curves of the Harley-Davidson Engine



Area of valve opening plotted against piston travel



Valve timing diagrams



Horsepower, torque and m. e. p. curves

magneto ignition, but most private customers prefer electric lighting to gas lighting and use the battery ignition system that goes together with the generating outfit. Where a magneto is fitted the Berlin is used. The generating and battery ignition equipment is made for the Harley-Davidson company by the Remy Electric Co. The generator is a shunt wound machine with automatic control. Current is generated at 6 volts and is used for operating the lamps, electric warning signal and the ignition, and it also keeps a 6 volt storage battery charged. The ignition system comprises a combined timer and distributor and two induction coils—one for each cylinder. The ignition switch is provided with a locking key which also controls the electric horn circuit, so that when the motorcycle is left in the street it is impossible for meddlesome persons to operate the signal. The battery of the electric system, which is of Exide make, is carried in a box behind the seat post. The headlight is provided with a main bulb and a small dimmer bulb and in addition to these the machine is equipped with an electric tail light throwing a beam of red light to the rear and a beam of white light downward so as to make it possible to read the number plate at night. The lights are controlled by a key switch which has all its working parts and connections inclosed. In one position the main headlight and tail light are on, in another position the dimmer light and tail light are on and in the third or neutral position, all lights are off. The warning signal is an electric vibrator horn and is operated by a button switch located convenient to the driver's left hand. Within the switch box there is a fuse which protects the battery and generator in case of an accidental short circuit in the wiring.

### Starting Engine

Starting of the engine is effected by means of a foot starter connected with the crankpin. This consists of a foot crank with pedal, the shaft of which is secured to a gear sector A which meshes with spur gear B on the clutch shaft. Both the sector and the gear have the same pitch radius. The spur gear is adopted to slide endwise on its shaft and by means of ratchet teeth CC on its outer face to engage with a ratchet clutch member D keyed to the transmission main shaft. A coil spring E holds the gear in engagement with the clutch member D on the shaft. When it is desired to start the engine by means of the step starter, the friction clutch must be engaged, but the transmission must be in the neutral position. When the step starter is not being used a coiled spring F surrounding the shaft of the starting crank holds the crank in such a position that the gear sector is out of mesh with the spur gear. The pedal of the step starter is swiveled and swings up close to the machine when not in use. As the teeth of the starter sector are out of mesh with those of the mating gear when the starter is not being used, it may happen that when the driver presses on the pedal the sector and gear will not come into mesh, one set of teeth abutting against the other. This can be overcome by means of an adjusting plunger in the housing, which when depressed brings the gear into a position where the sector will mesh with it properly. If the starter pedal does not go down readily the operator presses on the plunger with his heel. Sometimes it is necessary to use the plunger a second time before the gears are properly meshed.

### Engine Performance

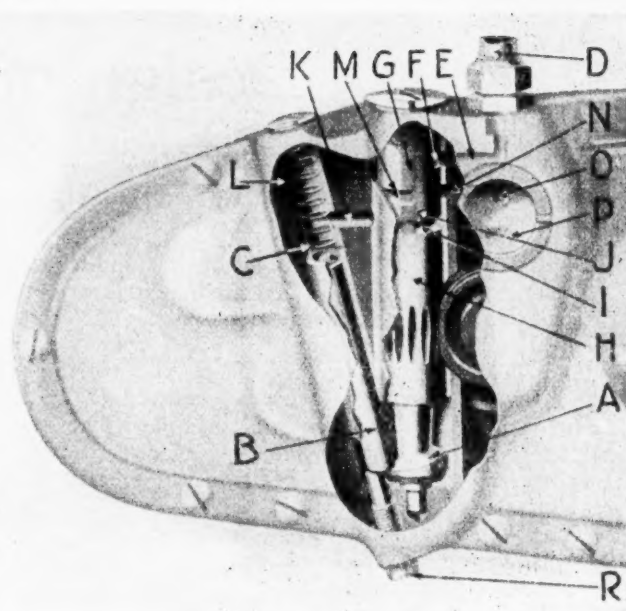
One of the unconventional features of the Harley-Davidson engine is the unequal valve timing for the two engines. This is due to the fact that the rock levers for one cylinder are turned around the other way from the rock levers for the other cylinder. The result is that the valve lift of the front cylinder is somewhat greater than the valve lift of the rear cylinder, and the opening period is somewhat longer. The cams are unsymmetrical, giving a quick opening of the exhaust valve and a quick closing of the inlet valve. With an engine of this type the horsepower, torque and m.e.p. curves shown in the accompanying diagram were obtained. The performance compares well with that of modern high-speed automobile engines, as the m. e. p. attains a maximum value of 83 lb. per square inch and at the speed of maximum output is 76 lb. per square in. The compression ratio is about 4.12:1



and the valve diameters are 1½ in. for the inlet and 1½ for the exhaust.

From the engine the power is transmitted by a roller chain to the friction clutch which is combined with the three-speed transmission. This clutch is of the dry-disk type and is inclosed in a separate housing. The driven sprocket is secured to the housing of the clutch, on the inside of which are formed keys which engage with keyways in one set of the clutch disks, while the other set of clutch disks have a driving connection with the main transmission shaft. The clutch is normally held in engagement by means of three coiled springs. For the clutch throwout a rod is provided which extends through the hollow main shaft of the transmission and at the opposite end carries a ball bearing throwout collar. This connects by a link to a lever arm on a shaft extending across the top of the transmission and carrying the clutch throwout lever, which is of the ball ended type. At the middle of its length this shaft carries a short lever arm adapted to engage into notches on a sector secured to the shaft of the gear shifting lever. Hence, when the clutch is engaged it is impossible to slide the sliding pinions of the transmission and to change the gear. In this way the teeth of the transmission gears are protected against abuse. The transmission affords three forward speeds but no reverse, which is unnecessary on a motorcycle. It has a single sliding set of two pinions which also carry the jaws for the direct drive clutch. The gear, of course, operates progressively. It is controlled by means of a lever convenient to the operator. Both ball and roller bearings are used in the transmission. The clutch is mounted on a double roller bearing with a felt ring soaked full of oil between them. The three gears on the countershaft are made in a single piece which revolves on the stationary countershaft on roller bearings. The main shaft of the transmission is mounted on a roller bearing at one end and a ball bearing at the other.

From a sprocket pinion secured to the free gear on the main shaft of the transmission the power is transmitted by a chain to the rear wheels. The sprocket wheel is secured to the rear hub on one side and the brake drum to the other. The rear axle is ¾ in. in diameter and carries the rear hub on ¾ in. ball bearings. The service brake is of the internal expanding type, completely inclosed and is operated by a pedal on the right foot board. The emergency brake is of the



Cut-away view of positive oiler

contracting band type and acts on the same drum. It is operated through a wire mechanism by means of a lever on the handle bar.

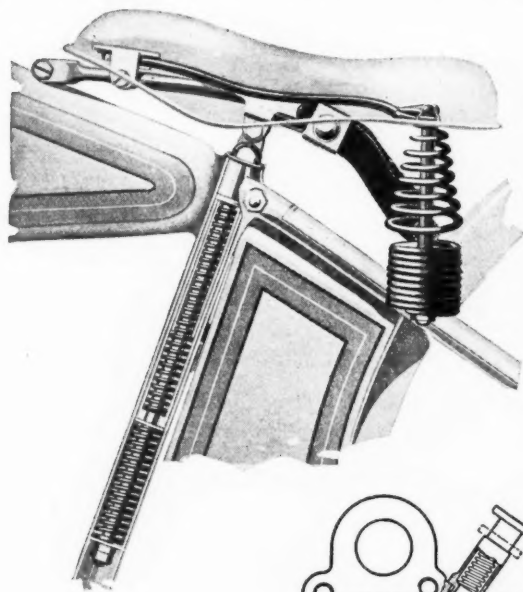
Both wheels are 28 in. in diameter and fitted with 3 in. motorcycle tires on standard C C rims. They have forty spokes each. The frame is described as a double bar loop frame and has frame fittings of drop forged steel. It is specially designed to have a side car attached and is strong enough to withstand the strains imposed by the side car. The engine is supported on the frame by means of lugs cast integral with the crankcase which are bolted to brackets braced to the frame. The transmission sets on a drop forged base forming a part of the frame and which is provided with oblong holes for the transmission bolts so as to admit of adjusting the chain tension. The tension of the rear chain can be adjusted by setting the rear axle further back in the rear fork. The wheel base of the machine is 59½ in.

The front fork has a double suspension, the weight on it resting on a heavy coiled spring in the head post and another lighter coiled spring takes the rebound. The handle bar, which is 1 in. in diameter, is bent up from heavy flat stock and autogenously welded. The grips are rotatable and serve as spark and throttle controls.

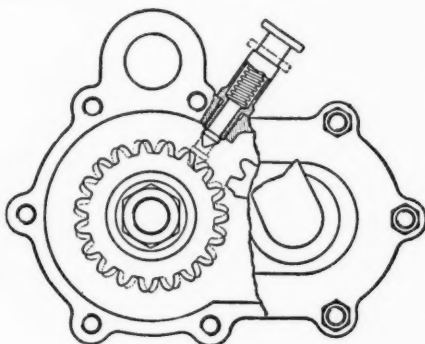
Fenders of cold rolled steel, 5¼ in. wide, are provided. The front fender has a large splasher flap and extension sides and the rear section of the rear fender is made removable to facilitate tire repairs. There is ample space between the tires and fenders to permit of applying non-skid chains.

The stand is mounted independent of the axle, thus permitting ready removal of the wheel. A patented stand latch makes it possible to drop the stand without soiling the hands. The luggage carrier is substantially made and independent of the rear axle. The saddle, a Troxel, is clamped to the saddle bar at two points, thus insuring permanent alignment. The seat post is spring mounted in a similar manner to the front fork, the weight of the rider being carried on one spring and the reaction cushioned by a reverse spring. In the electrically equipped model the tool box is placed on top of the tanks, on the other models between the seat post and the rear fender.

The sidecar is roomy and is comfortably upholstered. The seat cushion is supported on coiled springs and the seat backs and arm rests are padded. A rebound snubber prevents pitching. On the panel opposite the door is a bellows pocket, and the floor is covered with a rubber mat. With the sidecar attached the mileage of the motorcycle on one gallon of gasoline is reduced from 20 to 35 per cent. The motors of all motorcycles designed for sidecar operation are built with an increased compression chamber volume by placing plates under the cylinder flanges.



Above — Saddle and seat post suspension.  
On right — Meshing device for step starter



# Design of Coil Springs

With Special Reference to Valve Springs for Automotive Engines\*

By W. Ferrier Brown

IN these notes it is the intention to simplify and accelerate the calculation of coiled springs as far as is practicable by embodying constants, which are supplied in tabular form.

The formulæ given in the various engineering pocket books for coiled springs are practically alike, and differ mainly in the arrangement of formulæ. The selection for these notes is that given in Lyneham's "Mechanical Engineering," as this has been proved to give accurate results.

The symbols used in this formula are:

D = Diameter of wire in inches.

Δ = Total deflection in inches.

W = Total load in pounds.

w = Load per inch deflection in pounds.

n = Number of free coils.

d = Diameter of coil pitch circle in inches.

c = 12,000,000 lb. for steel.

For round wire:

$$\Delta = \frac{8Wnd^3}{cD^4} \quad (1)$$

$$\text{and } w = \frac{cD^4}{8nd^3} \quad (2)$$

For square wire:

$$\Delta = \frac{60.5Wnd^3}{8cD^4} \quad (3)$$

$$\text{and } w = \frac{8cD^4}{60.5nd^3} \quad (4)$$

Equations (2) and (4) form the basis, and from these the total deflection can easily be calculated thus:

$$\Delta = \frac{W}{w} \quad (5)$$

In addition to deflection, it is necessary to know the gage or diameter of wire, of which to make the spring to take a certain load.

In "Adams's Engineers' Handbook" the following formulæ are given:

Safe load for springs, such as valve springs,

$$= \frac{11,750D^3}{d} \quad (6)$$

This can be transposed to read:

$$D = \sqrt[3]{\frac{Wd}{11,750}} \text{ for round section} \quad (7)$$

For square section wire:

$$D = \sqrt[3]{\frac{Wd}{13,000}} \quad (8)$$

Safe load for springs that can be worked almost to the elastic limit

$$= \frac{27,400D^3}{d} \quad (9)$$

$$\text{or } D = \sqrt[3]{\frac{Wd}{27,400}} \text{ for round wire} \quad (10)$$

$$\text{and } D = \sqrt[3]{\frac{Wd}{30,000}} \text{ for square wire} \quad (11)$$

On examination of equations (2) and (4) it will be seen that the term  $cD^4$  is a constant factor, and has the values

$$\frac{cD^4}{8} \text{ in equation (2)}$$

$$\text{and } \frac{8cD^4}{60.5} \text{ in equation (4)}$$

Let these constants be represented by  $k$ . Equations (2) and (4) will then read:

$$w = \frac{k}{nd^3} \quad (12)$$

The value of  $k$  will be selected from the column for round or square wire, as the case may be, in the table herewith.

In this table values of  $k$  for round and square wire have been calculated over a range of from 0.5 in. to 0.020 in. This range covers the average run of automobile work. Special cases can always be calculated from the equations in their original form, i.e., equations (2) and (4).

The table also gives the cube and the fourth power of the various gages. These are used in conjunction with equations (2), (4), (6) and (9).

By way of illustration, let a coil spring be figured out (1) without the use of the tables and (2) using the tables.

Given particulars of spring:

Valve spring.

To take load of 40 lb.

Mean diameter of coil 1.4 in.

Length under above load 3 in.

DIAMETER		Cube	4th Power	VALUES OF $k$	
Approx.	Dec.			Round Wire	Square Wire
$\frac{1}{2}$ "	.500"	.12500	.06250	93,750	99,150
$\frac{1}{16}$ " +	.464"	.09990	.04635	69,530	73,550
$\frac{7}{16}$ " -	.432"	.08062	.03483	52,240	55,260
$\frac{1}{8}$ " -	.400"	.06400	.02560	38,400	40,610
$\frac{3}{8}$ " -	.372"	.05148	.01915	28,720	30,380
$\frac{1}{4}$ " +	.348"	.04214	.01467	22,000	23,270
$\frac{1}{16}$ " +	.324"	.03401	.01102	16,530	17,490
$\frac{1}{8}$ " +	.300"	.02700	.008,100	12,150	12,850
$\frac{3}{16}$ " -	.276"	.02102	.005,803	8,704	9,206
$\frac{1}{4}$ " -	.252"	.01600	.004,033	6,050	6,400
$\frac{1}{16}$ " -	.232"	.01249	.002,897	4,345	4,596
$\frac{3}{16}$ " -	.212"	.009,528	.002,020	3,030	3,205
$\frac{1}{8}$ " +	.192"	.007,078	.001,359	2,040	2,158
$\frac{1}{16}$ " +	.176"	.005,452	.000,959,5	1,440	1,524
$\frac{3}{16}$ " +	.160"	.004,096	.000,655,4	983.1	1,040
$\frac{1}{4}$ " +	.144"	.002,986	.000,430,0	645	682.3
$\frac{3}{16}$ " +	.128"	.002,097	.000,268,4	402.6	425.8
$\frac{1}{8}$ " -	.116"	.001,561	.000,181,1	271.6	287.3
$\frac{3}{16}$ " -	.104"	.001,125	.000,117,0	175.5	185.7
$\frac{1}{4}$ " -	.092"	.000,778,7	.000,071,64	107.5	113.7
$\frac{3}{16}$ " -	.080"	.000,512,0	.000,040,96	61.44	65
$\frac{1}{8}$ " +	.072"	.000,373,2	.000,026,87	40.31	42.64
$\frac{3}{16}$ " +	.064"	.000,262,1	.000,016,78	25.16	26.62
$\frac{1}{4}$ " +	.056"	.000,175,6	.000,009,834	14.75	15.61
$\frac{3}{16}$ " +	.048"	.000,110,6	.000,005,308	7.962	8.422
$\frac{1}{8}$ " -	.040"	.000,064,00	.000,002,560	3.840	4.061
$\frac{3}{16}$ " -	.036"	.000,046,66	.000,001,679	2.518	2.664
$\frac{1}{4}$ " -	.032"	.000,032,77	.000,001,049	1.573	1.663
$\frac{3}{16}$ " -	.028"	.000,021,95	.000,000,615	.9225	.9737
$\frac{1}{8}$ " +	.024"	.000,013,82	.000,000,332	.4980	.5267
$\frac{3}{16}$ " +	.022"	.000,010,65	.000,000,234	.3510	.3713
$\frac{1}{4}$ " +	.020"	.000,008,000	.000,000,160	.2400	.2530

\*Reproduced from The Automobile Engineer, London.



Spring to measure 2 in. overall when compressed solid.

Round section wire.

To find diameter of wire required:

$$\begin{aligned} \text{By (7)} \quad D &= \sqrt[3]{\frac{Wd}{11,750}} \\ &= \sqrt[3]{\frac{40 \times 1.4}{11,750}} \\ &= 0.1683 \text{ in.} \end{aligned}$$

Before proceeding further, it is necessary to fix the number of coils in the spring. Since the overall length is to be 2 in. when compressed solid, the maximum possible number of coils will be:

$$n = \frac{2}{0.160} = 12.5 \text{ coils}$$

This includes the dead coil at each end; hence the number of free, or working, coils will be taken as ten.

To find the load per inch deflection:

$$\begin{aligned} \text{By (2)} \quad w &= \frac{cD^4}{8nd^3} \\ &= \frac{12 \times 10^6 \times 0.0006554}{8 \times 10 \times 2.744} \\ &= 35.8 \text{ lb.} \end{aligned}$$

Alternative calculation, using constant  $k$  from tables:

$$\begin{aligned} \text{By (12)} \quad w &= \frac{k}{nd^3} \\ &= \frac{983.1}{10 \times 2.744} \\ &= 35.8 \text{ lb.} \end{aligned}$$

Knowing the value of  $w$ , we can get the necessary deflection to give a load of 40 lb., thus:

$$\text{By (5)} \quad \Delta = \frac{W}{w} = \frac{40}{35.8} = 1.12 \text{ in.}$$

The free length of the spring will therefore be 4.12 in.

It should be noted that the flexibility of the spring, i.e., the deflection, is directly proportional to the number of coils and to the cube of the coil pitch circle.

Having the calculated values of the spring, it is well to consider the method of giving the data to the spring maker.

It should be borne in mind that it is a difficult matter to get a spring correct within a narrow limit, so that in all cases the widest limits possible should be given for the load and the corresponding deflection. A minimum limit of 5 per cent either way should be the rule for general work.

Assuming the drawing is completed, it will be found more serviceable to tabulate the data and dimensions rather than have these intermixed with the drawing of the spring.

The following is a suggested list, and gives the values as calculated for the worked example:

Diameter of wire.....	0.1683 in.
Number of free coils.....	10
Free length (calculated).....	4.12 in.
To compress to.....	3 in.
Under load of.....	40 lb.
Limits of load and deflection.....	$\pm 5$ per cent
Must be capable of compressing to.....	2 in.
Inside diameter of coil.....	1.24 in.
Wound right hand.	

## Bijur Direct Shift for Starters

Involves Same Non-Jamming Feature as Geared Shift

THE Bijur Motor Lighting Co. has recently placed on the market a new line of electric starting motors which will be supplied during the coming season on a number of well known passenger cars and trucks. Among these are the Marmon, Hupmobile, Jordan, Apperson, Abbott, and Roamer cars, Grant-Denneen, Rainier, and Conestoga light trucks. This type is entirely distinct from the Bijur geared motor as used on the Packard and National cars, Nash and Denby trucks and Knox tractors.

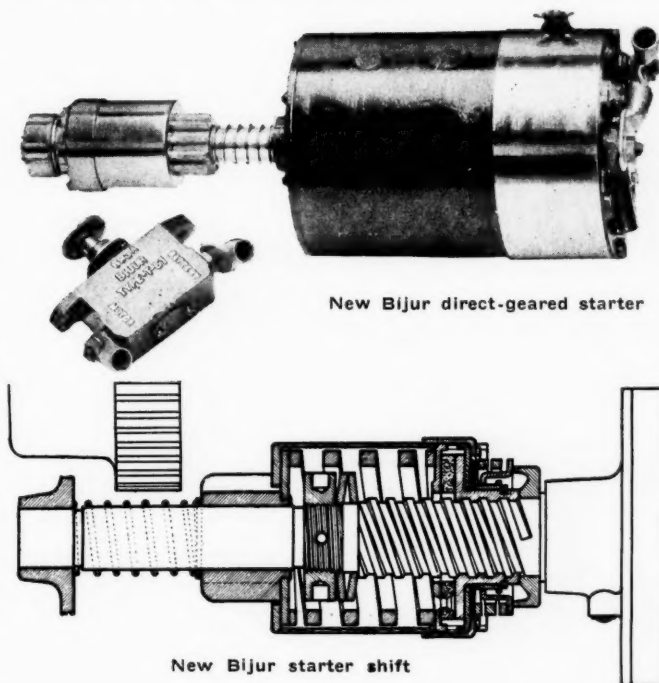
These motors are fitted with the new Bijur automatic direct shift. As shown in the accompanying cut, this mechanism consists of a pinion attached to a barrel-shaped casing and mounted on the motor armature shaft.

When the starting switch is closed, causing the armature shaft to revolve freely, the inertia of the drive mechanism prevents it from rotating as a unit with the shaft, with the result that the whole mechanism travels longitudinally, moving the pinion into mesh with the teeth of the flywheel.

In case the pinion teeth do not mesh smoothly with the flywheel but "butt" end to end—which occurs approximately once per three hundred starts—the mechanism does not jam. The pinion merely compresses the large spring, entering the barrel as it moves forward, until the clutch mechanism exerts sufficient force to rotate the pinion, snapping it into mesh with the flywheel, when normal cranking takes place.

The Bijur direct shift is mounted directly on the motor armature shaft, the screw threads being cut directly on the shaft instead of on a separate sleeve fitting over the shaft. This enables a shaft of larger diameter (and of considerably greater strength) to be used, while at the same time the pinion diameter may be reduced in size to give a more favorable cranking ratio. Taking as an example a motor giving three pounds torque under given cranking conditions, with a

126-tooth flywheel and the usual thirteen-tooth pinion this would give a torque of about 29.1 lb. at the crankshaft. With a ten-tooth pinion, as used on the Bijur motors, the torque would be 37.8 lb. at the crankshaft.



# England Wants More Tractors

Successful Trials in Scotland Show That American Manufacturers Should Now Investigate Sales Policies and Possibility of British Plants After War

**A**LTHOUGH a great deal of information has been published from time to time regarding the intensive plowing which has been done in England this year mainly with the aid of tractors, there has been little if any definite information regarding the results accomplished. Private advices from England state that the tractor plowing done last autumn and early this year has given England an additional five weeks' food supply. That is to say approximately the food output from British farms has been increased by 10 per cent owing to the use of tractors in the past twelve months.

## Agricultural Output Up 10 Per Cent

There are all kinds of conflicting reports regarding the effectiveness of tractor farming in England. Most of the British technical papers have confined themselves to descriptions of machines and to short stories dealing with particular uses of the tractor. There have been few if any critical articles, and a still smaller number dealing with the work done. There have been all kinds of political deficiencies, as is probably only natural when the Government takes on the organization of something so entirely novel as that of tractor farming. It appears that there are two departments, first, the food production department of the Board of Agriculture, and secondly the Agricultural Machinery Branch of the Ministry of Munitions. It has recently been made public that there has been considerable friction between these two departments, and if this is true it has no doubt been very harmful to the amount of work which the tractors might otherwise have done. There have been most bitter discussions as to the best kinds of tractor, and the machinery branch of the Ministry has been severely attacked for its approval of the Ford tractor. These attacks, so far as can be judged by reading from contemporary literature, seem to have originated mainly from persons interested in the sale or distribution of other makes of tractors, mainly, American makes, since the British output is extremely small, so small as to be entirely negligible at the present time.

## Ford Had Output

Probably the fact is that the Ministry of Munitions accepted Henry Ford's offer and adopted the Ford tractor, because it proved to be a reasonably satisfactory machine and because they could get it in quantities. It would obviously be a very great advantage to have the tractors as much standardized as possible, and by buying the 6000 Ford tractors which are stated to have been ordered and are all to be delivered by Feb. 1, 1918, the Government would be assured of a supply of one design machines, which means that they would have to train their operators only once. It was in consequence of the decision to recommend the Ford tractor that Mr. Perry, who was originally head of the agricultural machinery department of the Ministry, was forced to resign that position because he was also the European representative

of the Ford company. He was succeeded by Mr. S. F. Edge who stands with relation to the British industry very much as W. C. Durant stands with regards to the industry in America.

It now appears that Edge has been forced out of office by the Minister of Munitions Winston L. S. Churchill, and Edge is complaining that this was on account of his criticism of the food production department of the Board of Agriculture. Edge is succeeded by H. C. B. Underdown, who is managing director of Commercial Cars, Ltd., manufacturers of trucks. Compared with Mr. Edge, Underdown is an unknown man.

Although it would seem to be highly inefficient to make such a distinction, it appears that tractor plowing in Scotland is being handled by a separate body; the Scottish Board of Agriculture. This body is reported to be training a large number of men who are discharged from the army but are still fit for tractor operation. It is in Scotland also that the first real tractor trial to be held in the British Isles took place, these being held during the third week in October. These were organized by the Highland and Agricultural Society of Scotland. It held a demonstration in 1914 and another in 1915, but these very small affairs compared to the trials just concluded for the latter there were thirty-eight entrants and thirty machines actually appeared on the first day.

## Moving Trials Daily

The trials were run on a rather novel principle, in that demonstrations took place in different places each day. The first day was near Edinburgh, and at its conclusion the tractors were loaded on a special train and taken to a point close to Glasgow, the third day was near Perth, and so on. This, of course, is only possible in a country of small distances, but it follows the idea of the show circuit used for American demonstrations in 1916.

Each of the available fields was laid out in rectangular plots covering an area of about half an acre, and each machine was put on to plow this small area completely. The idea was to bring out the handiness of the machine in turning and its ability to finish the headlands. Nearly all the entries were of American machines, among which may be noted the Parrett, the Mogul and Titan of the International Harvester Co.; the Bates Steel Mule, Moline Universal, Ford, Emerson Brantingham and Wallis. Much of the land plowed was on steep hillsides, and the ability of the little Cleveland tractor to handle this is commented upon especially in the report in *The Commercial Motor*, London.

## High Praise for Wallis

Apparently by reading our contemporary's reports, the Wallis and the Parrett made the greatest impression on the minds of the majority of spectators. The former is referred to as undoubtedly from an engineer's point of view the best example of tractor construction present, while of the Parrett it is said, this is notable for its



even running and the use of a good old-fashioned governor on its engine, and an abnormally good steering lock.

It is understood that somewhere in the British Isles very elaborate tractor trials will be held some time next year, probably in August. At present every tractor which can possibly be shipped finds a customer waiting, in fact several customers.

The committee in charge of the Scottish trials will not have its report ready before December, due to the diversity of the design of machines and the difficulty of judging the comparative advantages of them. A committee was busy throughout the entire test scrutinizing the work of the machines and paying particular attention to such points as ease of manipulation, turning, reversing, the accessibility of parts, weight, power, nature of fuel consumed, lubrication, speed, and general efficiency.

Surprisingly little mechanical trouble was experienced despite the weather conditions, the exception being the difficulty of starting. The weather was not favorable, the Glasgow demonstrations being almost nullified by heavy rain storms, while at Perth there were frequent snow storms. This required changes in equipment of competitors at the eleventh hour. Many of the machines ran the entire six days of the trial without mechanical adjustment. The plows gave trouble, as at Glasgow some of the ground had not been plowed for 50 years.

#### Must Run on Roads

A tractor factor that might not be noticed in America, but is important in England and Scotland, is that when tractors have to be driven from one field to another the run has to be made on hard, stony roads, and that when tractors are driven several miles from railroad stations they have to travel over similar roads. This makes sufficient springing essential. There is no reason why the tractor should not be used on the road to tow other vehicles, providing such matters are looked into.

Another consideration with regard to tractors for Europe is that they should be as low as possible, in order to pass under the trees, which are very numerous in parts of the country.

It is estimated that at present there are 6000 motor tractors in the United Kingdom, which embraces England, Scotland and Wales; and that 15,000 tractors will be in operation by next spring.

There is no anticipation that the fuel shortage will have any effect on the development of the tractor in Great Britain. No tractor is allowed to be imported unless it can be run on paraffin, which is similar to kerosene, although a small portion of gasoline is allowed for starting purposes in the morning. All of the machines in the Scottish demonstrations were run on paraffin, with the exception of two steam tractors, which used coal and coke respectively.

Farmers in Great Britain are in a better position financially than they have ever been in the history of the country, and the various bounties and guarantee prices which are promised to farmers for the next few years guarantee satisfactorily their enterprise in cultivating new ground. For these reasons the tractor business is going to have a decided boom, always provided, however, that new difficulties in the supply of fuel will not interfere.

Among some of the newer English tractors are the following:

The Alldays uses a four-cylinder vertical engine, three-speed gearset, with machine cut and inclosed spur gearing, and has final drive by single chain to the rear axle. The axle embodies the practice of the steam-traction en-

gine in placing the differential at one side of the axle, with means for suspending its action when conditions of haulage cause wheel slippage. Provision is made by fitting a water-ballast tank over the back axle to increase haulage for road use.

A novel feature is that of putting out of action the leaf-type rear springs when working on soft land and restoring their function when traveling on hard roads. This was the only tractor incorporating such a device, although many of the others used coil springs. This tractor has two independent brakes, one a pedal band and the other a wheel-and-screw band on the axle. The Alldays, in steering, uses a combination of the traction-engine type of center-pivoted chain-and-link scheme, and the Ackerman system of rigid beam axle and pivoted axle ends, the drag link being attached to the respective stub axle ends and a cross rod coupled to both to equalize the pull-and-thrust movement.

The new Simplex tractor has certain patented features and has provision for being supplied with a set of interchangeable rubber-shod wheels when it is used on the road. The front end of the chassis is supported on short, semi-elliptic springs and the rear end without springs. Steering is by rack and pinion, with the usual Ackerman stub axle layout. Both sets of road wheels are cast iron; the front is 30 in. in diameter.

The Wyles tractor uses a single-cylinder, 9-hp. engine, and drives through a gear system using machine-cut gears. It plows 3 acres in 10 hours. Ball bearings are used in the gearbox. The wheels are 33 in. in diameter, with 7 in. width.

The Fowler tractor has a self-operating mechanism for raising or lowering the plows, which seems to be an important necessity in order to conserve man power. It has capacity of 3 acres in 10 hours. Ball bearings are used in several parts of this tractor.

It is very clear and obvious to any one who has been reading the tractor articles in British technical papers for the last year that there was never a time, and probably there never will be a time again, so entirely suitable for American tractor manufacturers to consolidate their position in the British Isles. The American tractor which gains a good reputation during the next twelve months on British farms is assured of a prominent position. The reputation obtained by any particular machine is likely to depend almost as much upon the way in which its sale and maintenance is handled as upon the intrinsic merits of the tractor. Therefore it would seem highly desirable for tractor manufacturers to take special pains to see that they are not merely *selling* tractors in England, for they can do that anyway as long as they can obtain shipping, but that the tractors which they sell are giving the best possible satisfaction. It is a time when a very large proportion of the money made by sales in Great Britain should be spent upon cultivation of the British market. It must be remembered that a headquarters in London will control future sales over a much larger area than that occupied by the British Isles because the business of the British Empire with the exception of Canada perhaps is mainly centered in London. A tractor which is well known and widely used in England should be easier to sell in South Africa, in Australia, in New Zealand and in other parts of the Empire.

It is unlikely that there will be any severe restriction placed upon the importation of American tractors immediately after the war, because Great Britain certainly will not be able to care for the demand from her own country for quite a long time to come. If such restrictions do come, then an American manufacturer, with a good sales business in England, could readily establish a manufacturing plant with a certainty of success.

# Detail Changes in New Marmon

New Features Include a Slanting Windshield, Plain Bearing Fan, Magnetic Tank Gage, One Key for Switch, Gear Lever and Toolbox Locks, Tonneau Light and Glass Window in Top—Prices Increased

THE new series of Marmon cars is very similar to the 1917 series. All of the most important features, such as the aluminum engine, the special frame and running board construction and the graduated rear cross springs, are retained, but numerous changes have been made in details. The new series will also be known as the 34, this designation being based on the S. A. E. engine rating.

The outline of the rear seat has been changed somewhat, the inclination of the rearmost part of the top line having been reduced. Formerly the front seat was of the semi-divided type, but the division has been eliminated and the front seat is now a plain double seat. The windshield, instead of being straight, now slopes backward at an angle of 10 deg., and the windshield mounting extends down inside the cowl to the frame channels.

A change in the engine design has permitted of dispensing with the sheet metal side plates on both sides. These side plates covered openings in the cylinder jacket and in the valve rod chamber respectively. The cylinder block is now cast without these openings. The Marmon company is now manufacturing the radiator fan itself, and instead of the ball bearing fan, which occasionally gave trouble, a plain bearing fan has been adopted.

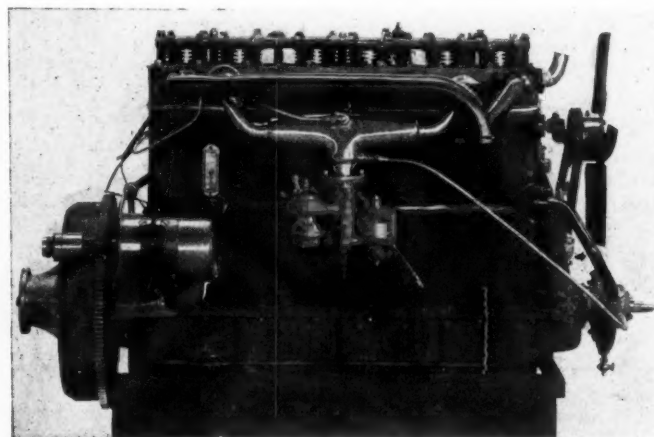
The fan hub is in the form of a drum which forms an oil reservoir. A sort of cam is secured to the stationary shaft, and the fan hub in its revolution carries the oil around to the upper side of this cam, against a wall or dam thereon. Just in front of this dam there is a drill hole to the center of the shaft. The shaft is bored out axially and radial holes place the center hole in the shaft in communication with the two bearing surfaces of the fan hub. Hence a comparatively large supply of oil can be carried in the hub, and oil is constantly fed to the bearing surfaces as long as the engine is running. The thermostat formerly supplied as regular equipment has been dispensed with and instead a Motor-Meter is now fitted. The thermostat can be supplied, however, on special order.

The Bijur starting and lighting system will be regular equipment in 1918 Marmon cars. The starting motor is held in place by means of a strap fastening and is directly geared to the engine flywheel by means of the new Bijur screw shift drive. The Bosch magneto is retained for ignition and is driven through the Bijur generator.

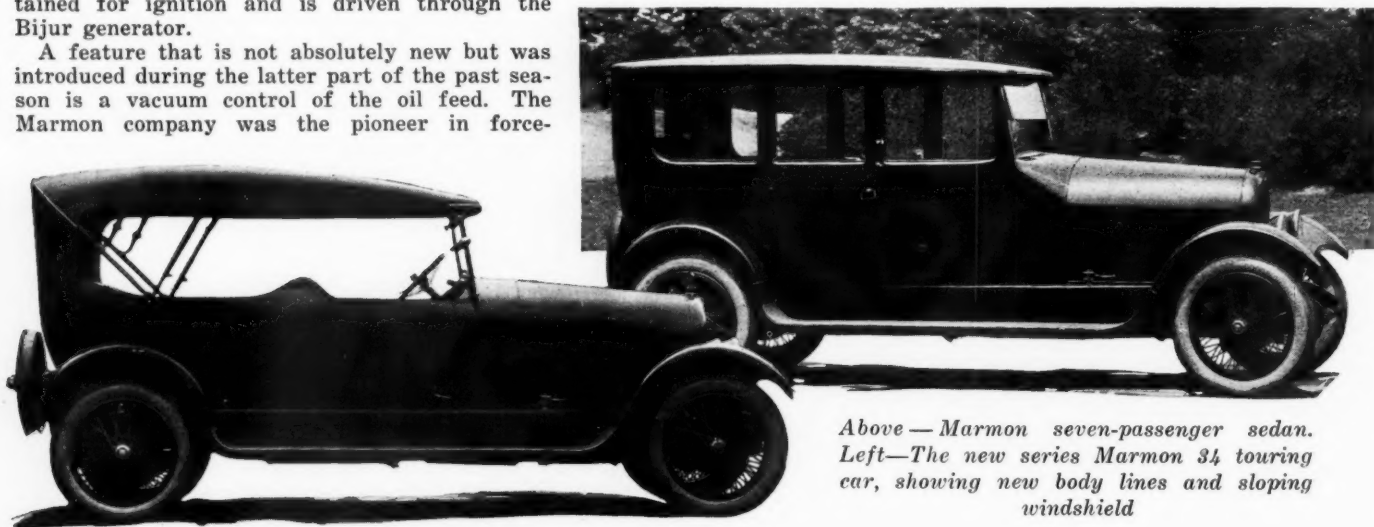
A feature that is not absolutely new but was introduced during the latter part of the past season is a vacuum control of the oil feed. The Marmon company was the pioneer in force-

feed lubrication in this country and has consistently adhered to this system. The lubricating system is generally adjusted in a new engine to give an oil pressure of 15 lb. per square inch on the bearings. When the engine is throttled down very low, this results in a much greater oil supply to the bearings than is actually necessary, with the result that there is a tendency to carbon formation and waste of oil. This has been overcome by the provision of a vacuum-operated valve which, when the vacuum in the intake manifold exceeds a certain value, opens a by-pass in the lubricating system, so that only the pressure due to a head of less than engine height remains on the oil.

The lubricating system as now worked out is clearly illustrated in the accompanying diagram. Oil is supplied through a filler on top of the engine and passes down around the valve push rods into a large capacity cast aluminum oil pan, which is cooled by ribs along the base. From this oil

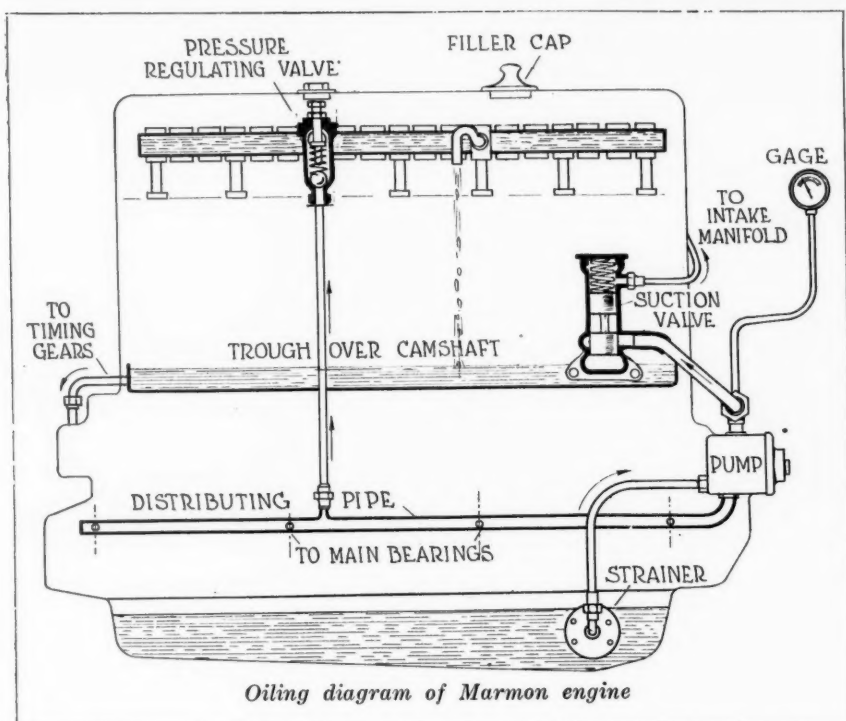


*The new Marmon engine with valve cover removed, showing the cylinder block without side plates, the plain bearing fan with oil reservoir, the Bijur starter and waterjacketed intake manifold*



*Above—Marmon seven-passenger sedan. Left—The new series Marmon 34 touring car, showing new body lines and sloping windshield*





sump, oil is drawn through a gauze strainer into the gear pump at the rear end of the camshaft. This pump delivers oil into the main feed pipe under pressure, the amount of pressure being indicated by the gage. By means of the vacuum valve this pressure is automatically reduced at low engine speed. A sectional view of the vacuum valve is shown.

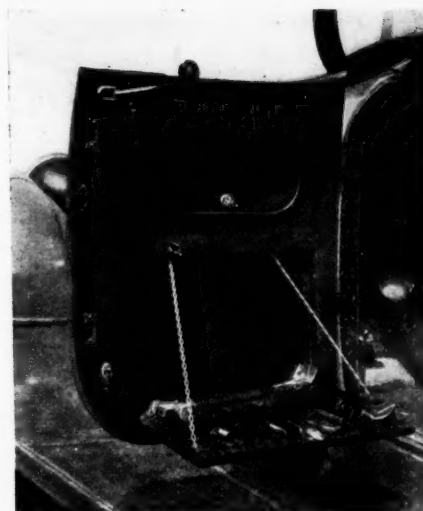
The upper part of the valve chamber communicates through a small pipe with the inlet manifold. Within the valve chamber there is a piston valve which is forced downward by a spring above it. The suction in the intake manifold, however, tends to lift the valve, and when it becomes sufficiently great to overpower the spring the valve is lifted and communication established between the delivery side of the oil pump and the oil sump. This removes all pressure from the oil system, except that due to the head of oil determined by the highest point of the bypass line.

Oil is conducted from the main feed pipe to the center of each of the four main crankshaft bearings. A circular groove around the bushing is thus filled with oil under pressure, from which it spreads over the whole bearing surface. Oil is also forced into the hollow crankshaft and through same to the crankpin bearings. The throw-off from the crankshaft lubricates the cylinder walls and piston pins. The piston is provided with means for scraping the excess oil from the cylinder walls.

The maximum pressure in the main feed pipe is limited by a ball check valve which is adjustable without removing the engine cap. The excess oil passing through this check valve circulates through the hollow rocker arm shaft, lubricating the valve rockers and contacts. Oil which escapes from this shaft flows down along the valve push rods into an oil container above the valve tappets, cams and camshafts, thus providing a constant head of oil for these and also for the camshaft gears.

A change has been made in the design of the clutch throw-out, which is now provided with a felt washer soaked with oil so that it will always be supplied with lubricant. The change gear lever, which is of the ball ended type, is now provided with a lock so as to permit of locking it in the neutral position. The key used for this lock is also used for locking the tool compartment in the left front door, and, in fact, only a single key is now required with the car. Tools are held in pockets on the door of the compartment, which swings downward and is held in a horizontal position by two chains.

A new lighting switch is fitted to the instrument board, in what may be referred to as the neutral position of the switch,



Locking tool kit in left front door

all lamps are off, but if the key is turned down the magneto is on and the engine can be run. In position 1 the horn, tonneau light and instrument light are on; in position 2 the dimmer and tail light are on and in position 3 the head light and tail light are on. The switch can be locked in any position. The tonneau light referred to is a new item in Marmon equipment. It lights automatically by a door switch when the right rear door is opened, but it can also be lighted up by means of a push switch on the light itself.

As in the previous series, the gasoline tank is carried in the cowl, but in order to prevent gasoline fumes getting into the driver's compartment, a magnetic type of gasoline gage has been adopted, which permits of completely sealing the tank, except for the vent, and this is carried down under the hood to a point below the body, so no fumes from it can get into the body.

The speedometer trip setting is now underneath instead of adjacent to the instrument. The top has a French plate glass window in the rear which is hung by belts. Hayes wire wheels will be used the coming year, the standard tire sizes being 32 by 4½ on open models and 33 by 5 on closed models.

Considerable attention has been paid to closed car models, of which three types are furnished—limousine, sedan and town car. In the limousine there is room for five passengers in the inclosed compartment. The auxiliary seats fold forward and out of the way when not in use. The general design of the body has been greatly improved in appearance. The town car is the same as the limousine, except that the roof does not extend over the driver's compartment. However, provision is made for protecting the driver.

The sedan accommodates seven passengers within the same inclosure. It has two wide doors, one on either side, and the front seat is entered through an aisle between the seats. The back of the right front seat folds forward to afford freedom of movement in the car. While the sedan is of the non-convertible type the windows can be lowered so that in good weather the advantages of an open car may be had.

Prices on all models have been increased somewhat and are now as follows: Seven-passenger touring car, \$3,550; five-passenger touring car, \$3,500; four-passenger roadster, \$3,550; sedan (non-convertible), \$4,950; limousine, \$5,250; town car, \$5,250; landaulet, \$5,350. In addition to its standard bodies the Marmon company is in a position to furnish cars with special designs of closed bodies by Rubay at the following prices: Limousine, \$5,750; town car, \$5,700. For the benefit of those who may wish to have bodies built to their own specifications, the Marmon company offers the chassis without body, with instrument board and instruments fitted, and with front and rear fenders, hood, starting and lighting systems, lamps, standard chassis equipment, tools, etc., at \$3,200.

## Reference Table Giving Relation Between Wheel Diameter, Gear Ratio, Road Speed and Engine Revolutions

Miles per Hour	R.p.m. of Rear Wheel	R.P.M. OF ENGINE							
		Rear Axle Ratio							
		3	3½	4	4¼	4½	4¾	5	5¼
30-INCH WHEELS									
60	672.269	2016.807	2352.941	2689.076	2857.143	3025.210	3193.277	3361.345	3529.412
50	560.224	1680.672	1960.784	2240.896	2380.952	2521.008	2661.064	2801.120	2941.176
40	448.179	1344.538	1568.627	1792.717	1904.762	2016.807	2128.852	2240.896	2352.941
30	336.134	1008.403	1176.471	1344.538	1428.571	1512.605	1596.639	1680.672	1764.706
20	224.090	672.269	784.314	896.359	952.381	1008.403	1064.426	1120.448	1176.471
10	112.045	336.134	392.157	448.179	476.190	504.202	532.213	560.224	588.235
5	56.022	168.067	196.078	224.090	238.095	252.101	266.106	280.112	294.118
31-INCH WHEELS									
60	650.583	1951.748	2277.040	2602.331	2764.977	2927.623	3090.268	3252.914	3415.560
50	542.152	1626.457	1897.533	2168.609	2304.147	2439.686	2575.224	2710.762	2846.300
40	433.722	1301.166	1518.027	1734.888	1843.318	1951.748	2060.179	2168.609	2277.040
30	325.291	975.874	1138.520	1301.166	1382.488	1463.811	1545.134	1626.457	1707.780
20	216.861	650.583	759.013	867.444	921.659	975.874	1030.089	1084.305	1138.520
10	108.430	325.291	379.507	433.722	460.829	487.937	515.045	542.152	569.260
5	54.215	162.646	189.753	216.861	230.415	243.969	257.522	271.076	284.630
32-INCH WHEELS									
60	630.252	1890.756	2205.882	2521.008	2678.571	2836.134	2993.697	3151.260	3308.823
50	525.210	1575.630	1838.235	2100.840	2232.143	2363.445	2494.748	2626.050	2757.353
40	420.168	1260.504	1470.588	1680.672	1785.714	1890.756	1995.798	2100.840	2205.882
30	315.126	945.378	1002.941	1260.504	1339.286	1418.067	1496.949	1575.630	1654.412
20	210.084	630.252	745.294	840.336	892.857	945.378	997.899	1050.420	1102.941
10	105.042	315.126	367.647	420.168	446.429	472.689	498.950	525.210	551.471
5	52.521	157.563	183.824	210.084	223.214	236.345	249.475	262.605	275.735
33-INCH WHEELS									
60	611.154	1833.461	2139.037	2444.614	2597.403	2750.191	2902.979	3055.768	3208.556
50	509.295	1527.884	1782.531	2037.178	2164.502	2291.826	2419.149	2546.473	2673.797
40	407.436	1222.307	1426.025	1629.743	1731.602	1833.461	1935.320	2037.178	2139.037
30	305.577	916.730	1069.519	1222.307	1298.701	1375.095	1451.490	1527.884	1604.278
20	203.718	611.154	713.012	814.871	865.801	916.730	967.660	1018.589	1069.519
10	101.859	305.577	356.506	407.436	432.900	458.365	483.830	509.295	534.759
5	50.929	152.788	178.253	203.718	216.450	229.183	241.915	254.647	267.380
34-INCH WHEELS									
60	593.178	1779.535	2076.125	2372.714	2521.008	2669.303	2817.598	2965.892	3114.187
50	494.315	1482.946	1730.104	1977.261	2100.840	2224.419	2347.998	2471.577	2595.156
40	395.452	1186.357	1384.083	1581.809	1680.672	1779.535	1878.398	1977.261	2076.125
30	296.589	889.768	1038.062	1186.357	1260.504	1334.652	1408.799	1482.946	1557.093
20	197.726	593.178	692.042	790.905	840.336	889.768	939.199	988.631	1038.062
10	98.863	296.589	346.021	395.452	420.168	444.884	469.600	494.315	519.031
5	49.432	148.295	173.010	197.726	210.084	222.442	234.800	247.158	259.516
35-INCH WHEELS									
60	576.230	1728.691	2016.807	2304.922	2448.980	2593.037	2731.095	2881.152	3025.210
50	480.192	1440.576	1680.672	1920.768	2040.816	2160.864	2280.912	2400.960	2521.008
40	384.154	1152.461	1344.538	1536.615	1632.653	1728.691	1824.730	1920.768	2016.807
30	288.115	864.346	1008.403	1152.461	1224.490	1296.519	1368.547	1440.576	1512.605
20	192.077	576.230	672.269	768.307	816.327	864.346	912.365	960.384	1008.403
10	96.038	288.115	336.134	384.154	408.163	432.173	456.182	480.192	504.202
5	48.019	144.058	168.067	192.077	204.082	216.086	228.091	240.096	252.101
36-INCH WHEELS									
60	560.224	1680.672	1960.078	2240.896	2380.952	2521.008	2661.064	2801.120	2941.176
50	466.853	1400.560	1633.987	1867.414	1984.127	2100.840	2217.554	2334.267	2450.980
40	373.483	1120.448	1307.190	1493.931	1587.302	1680.672	1774.043	1867.414	1960.784
30	280.112	840.336	980.392	1120.448	1190.476	1260.504	1330.532	1400.560	1470.588
20	186.741	560.224	653.595	746.965	793.651	840.336	887.021	933.707	980.392
10	93.371	280.112	326.797	373.483	396.825	420.168	443.511	466.853	490.196
5	46.685	140.056	163.399	186.741	198.413	210.084	221.755	233.427	245.099



# Analysis of Crankshaft Stresses

## Features of Different Bearing Layout—Effect of Number of Cylinders— Difference Between Six and Twelve of Same Size

By Otto M. Burkhardt

Research Engineer Pierce-Arrow Co.

**G**ASOLINE engines of the kind at present produced in large quantities for airplanes and motor vehicles may turn over as fast as 3000 r.p.m. or faster. The forces necessary to induce and maintain these speeds, as well as other forces closely associated with high speeds, are numerous, but with a particular object in mind we shall in the following confine ourselves to the three most important groups of forces: the pressures due to the gaseous mixture, the inertia forces and the centrifugal forces. The smooth running and the life of an engine depend mainly on these three factors.

The reciprocating masses linked to the crankshaft we shall consider as one single mass concentrated at one point in the axis of the cylinder. This simplification implies that the inertia forces are, like the gas pressures, acting primarily in the direction of the cylinder axis, a condition which permits of arithmetical addition of both groups of forces. To the same category belongs another group of forces which has, according to a well-known law, its origin in the angularity of the connecting rod. These different component forces have been determined for two engines of equal capacity for 24 crank positions. These positions are uniformly spaced at intervals of 30 deg. They comprise two revolutions, which constitute one complete cycle in case of four-stroke cycle engines.

### Compare Six and Twelve

As subject for investigation, a medium-size 6 and 12-cylinder engine, both of the same cylinder volume, have been chosen. Both engines are supposed to be analogous in design and up to the same standard of engineering. Some particulars relating to these engines are given in the following table:

	Six Cyl. Engine	Twelve Cyl. Engine
Cylinder bore.....	3 3/4 in.	3
Stroke (Bore x 1.667)....	6 1/4 in.	5
Weight of reciprocating parts (one cylinder)...	4.07 lb.	2.6 lb.
Weight of rotating parts (one cylinder).....	2.4 lb.	1.93 lb.
Weight of rotating parts (two cylinders).....		3.86 lb.

Fig. 1 is a force diagram pertaining to the six cylinder engine. The concentric circle is a graphical representation of the centrifugal forces acting on the crankpin at a speed of 2700 r.p.m. The combined gas and inertia forces, as above referred to, are represented by the zig-zag diagram.

For instance, 0-3 of this diagram represents magnitude and direction of the combined gas and inertia forces if the crankpin is in position 3, sixty degrees apart from the top dead center. For one complete cycle we find that,

The power stroke is represented by forces 0-1 to 0-7.

The exhaust stroke is represented by forces 0-7 to 0-13.

The suction stroke is represented by forces 0-13 to 0-19.

The compression stroke is represented by forces 0-19 to 0-1.

In order that we may obtain a clear picture of the total loads acting on a crankpin, we must combine both diagrams as follows: 0-1 of the zig-zag diagram with 0-1 of the concentric circle diagram, and so on. This yields the diagram shown in Fig. 2. It represents the magnitude and direction of the resulting loads acting on the crankpin of a six-cylinder vertical engine.

The combined gas and inertia forces for one unit of a

twelve-cylinder engine and the corresponding centrifugal forces are diagrammatically represented in Fig. 3. We observe that these forces are much smaller but quite analogous to those given in Fig. 1. Combination of the gas and inertia forces with the centrifugal forces yields the diagram shown in Fig. 4, which represents magnitude and direction of the resulting forces per cylinder, acting on the crankpin of a twelve-cylinder engine.

### Firing Order

We must, however, bear in mind that in the case of the engine now under consideration, there are two single cylinder engines acting on one crankpin. We have, therefore, to superimpose two diagrams so that their vertical axes include an angle of 60 deg. (see Fig. 5). It may be mentioned here that the crank positions 1 to 24 in the diagram are plotted according to clock-wise rotation of the crankshaft. The distinction between the right and left block of cylinders through the indices *R* and *L* is made by similarly viewing the engine. According to the conventional sequence of firing, we obtain:

1<sup>L</sup> 5<sup>L</sup> 2<sup>R</sup> 3<sup>L</sup> 6<sup>L</sup> 1<sup>R</sup> 2<sup>L</sup> 4<sup>L</sup> 3<sup>R</sup>  
6<sup>R</sup> 2<sup>R</sup> 4<sup>R</sup> 1<sup>R</sup> 5<sup>R</sup> 3<sup>R</sup>

From this we see that the engine to the right is in phase 420 deg. behind the other, or (what is to the same effect) 300 deg. ahead of it. From this follows that we have to combine force 0-1<sup>L</sup> due to the left engine with force 0-11<sup>R</sup> due to the right engine and so on. This properly carried out for all simultaneous acting forces yields a diagram representing magnitude and direction of the forces acting on the crankpin of a twelve-cylinder "V" type engine. See Fig. 6.

It is difficult to neutralize the forces shown in Figs. 2 and

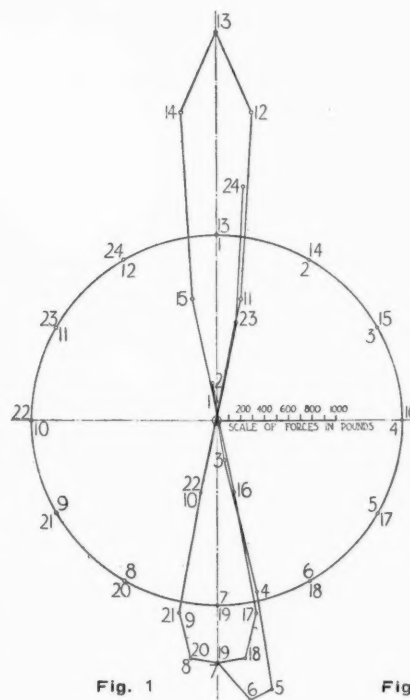


Fig. 1

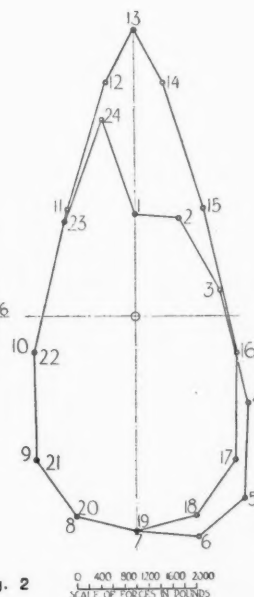


Fig. 2

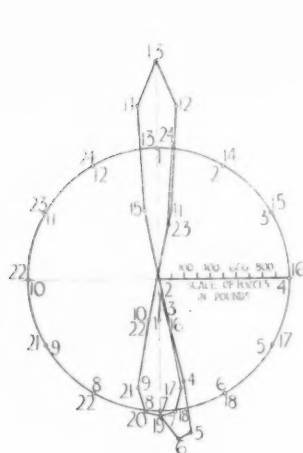


Fig. 3

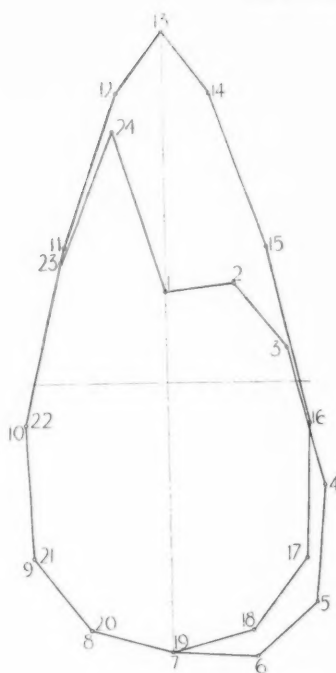


Fig. 4

6 in their effect on the crankpin by means of balance weights. The reason is that the centrifugal forces involved are due to a mass performing a relative motion. That is to say, the rotating mass of the connecting-rod is not truly rotating about its own center but turns relative to another mass which turns about a center of its own.

Balance weights in order to be effective under these circumstances would in turn have to perform relative motions. This introduces extra friction and complication. Balance weights to this effect are, however, quite feasible for six-cylinder engines, but they are almost an impossibility for twelves.

The diagrams then reveal the fact that the forces are smallest in a horizontal direction. This suggests that the oil holes in the crankpin should be placed at right angles to the radial lines through its center. Its direction should be preferably opposite to that of rotation. To prevent the oil from escaping, a labyrinth should be cut in the bearing surface of the bushing where the forces are a minimum.

A glance at Figs. 2 and 6 shows that the difference in the loads acting on the crankpin of either engine is not very marked. The maximum load in the case of the twelve is 4040 lb., and in the case of the six it is 4795 lb. The difference between the two is 18½ per cent. These loads increase approximately as the square of the speed. If then the twelve cylinder engine runs at 2940 r.p.m. it is subject to the same maximum load as the six when running at 2700 r.p.m. Mention is made of this because we generally find in practice that a car with a twelve-cylinder engine is geared so that the engine runs at slightly higher speed than a six-cylinder engine would be made to run.

#### Mean Pressure

The life of a crankshaft bearing depends largely on the magnitude of the mean pressure derived from the various loads acting during one complete cycle. We find that this is in the case of the six 15 per cent smaller than in the case of the twelve. Now it is an axiom in bearing design that a certain permissible load per unit of bearing surface should not be exceeded. Nevertheless shall we not content ourselves with speaking of maximum or mean loads exclusively. This seems to be a mistake which is committed by altogether too many engineers who endeavor to design high speed engine bearings with a certain specific load as their only guide.

Designers also should not lose sight of the fact that intermittent loads such as we have to deal with in high speed internal combustion engines affect bearings differently than

a steady load. It is well understood that a load acting continually in one direction is likely to cause lubrication difficulties. But to what extent a bearing will behave well under the effect of a steady load is well brought to light through an experiment by Professor Goodman, who states that he has had a journal running for weeks with a surface velocity of 4 ft. per second under a steady load of 4480 lb. per square inch, the journal being kept at a temperature of 110 deg. Fahr. by a stream of water forced through it.

It is evident that bearing loads of this magnitude are hardly permissible under conditions where the load is subject to frequent and abrupt changes in direction unless an unusual amount of attention is being given to the maintenance of a certain running clearance by frequent adjustments. Therefore it is advisable under ordinary circumstances either to avoid fluctuations in load or to reduce the specific bearing pressure. For instance, the maximum permissible load per square inch of bearing surface on crankpins of slow running stationary gas engines and locomotives is about 1500 lb.

Furthermore, it is essential for an engineer to bear in mind the well known fundamental empirical law of fluid motion which expresses that the resistance to sliding is due to the shearing of the fluid film and is consequently a function of the velocity of shearing, the viscosity of the fluid and the shearing area. This law has proved useful for solving lubrication problems and conforms with the well known experiments by Beauchamp Tower which revealed that the frictional resistance of a journal at a constant temperature is directly proportional to the square root of the rubbing velocity and independent of the total load.

The different laws of friction and carrying power so far spoken about presuppose the presence of an oil film of not less than a certain thickness between the journal and the bearing. Without this no bearing can be safe against undue abrasion. To maintain this much desired oil film, it is obvious that the designer should as far as possible protect bearings from unequal pressure distribution, from abrupt changes in the direction of these pressures and from undue rise of temperature.

#### Pressure Distribution

The pressure distribution which is in most cases more or less imperfect depends on the design of the crankshaft. The character of pressures can be determined by means of diagrams from which in turn, together with the circumferential velocity of the journal, the work expended in friction may be obtained. The rise in temperature may be expressed as a function of the work expended in friction, if we limit ourselves to conditions where the radiating surface of the bearing and the feed of oil are the same.

The frictional work per square inch of bearing surface is mathematically expressed by:

$$(1) \quad w = \mu \frac{P}{dL} \times \frac{d\pi N}{12 \times 60} = \mu p v.$$

In this equation is:

$w$  = Work expended in friction per second and per square inch of bearing surface.

$\mu$  = Coefficient of friction.

$P$  = Total bearing lb.

$p$  = Specific bearing load lb., per square inch.

$d$  = Diameter of shaft in.

$L$  = Length of bearing in.

$N$  = R.p.m. of shaft.

$v$  = Circumferential velocity of shaft in ft. per sec.

From equation 1 follows:

$$(2) \quad p v = \frac{PN}{229 L}$$

According to data gathered from well performing and durable engines it may be stated that the value of  $p \times v$  should not exceed 17,000 ft.-lb. per second. This value is far in excess of other similar values. Güldner states that in case of stationary gas engines the maximum limiting value of  $p \times v$  based on experience is about 1500 ft.-lb. per second for bearings lined with white metal. From this it is quite evident that values of 17,000 ft.-lb. are permissible only in cases where forced lubrication is used.



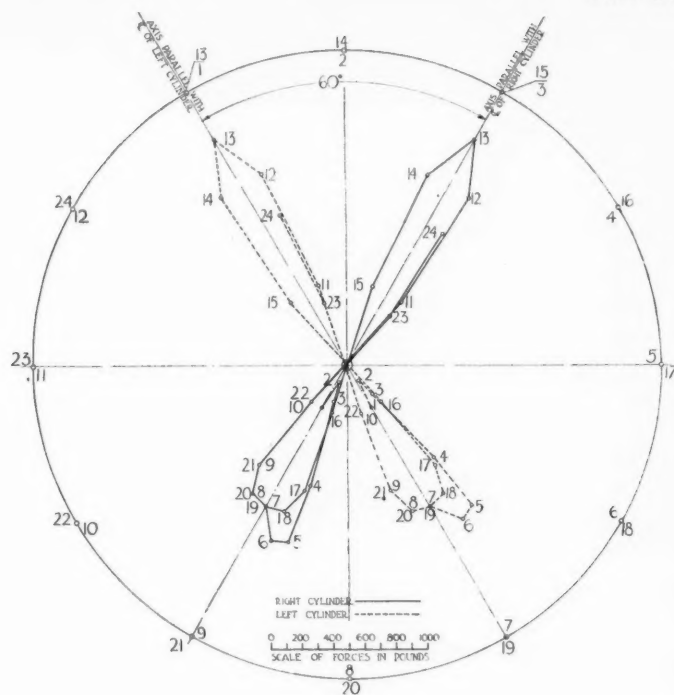


Fig. 5

In this connection the author wishes to suggest some action by the S. A. E. Standards Committee along the line of determining  $p \times v$  values for different lubricating systems.

To apply this pressure velocity criterion to the two engines under consideration we have to determine the mean pressure of a complete cycle from Figs. 2 and 4. These are 2870 lb. and 1650 lb. for the six and twelve respectively. Assuming a crankpin diameter of  $2\frac{1}{8}$  in. for either engine we obtain, at 2700 r.p.m., a rubbing velocity of

$$V = \frac{2\frac{1}{8} \pi 2700}{60 \times 12} = 25.02 \frac{\text{ft.}}{\text{Sec.}}$$

With a crankpin length of 2 in. we obtain, in the case of the six

$$p v = \frac{2870 \times 2700}{229 \times 2} = 16,900 \frac{\text{ft.-lb.}}{\text{Sec.}}$$

With a crankpin length of  $1\frac{5}{32}$  in. we obtain, in the case of the twelve

$$p v = \frac{1650 \times 2700}{229 \times 1\frac{5}{32}} = 16,825 \frac{\text{ft.-lb.}}{\text{Sec.}}$$

The total crankpin length of the twelve, if the connecting-rods are arranged side by side, should therefore be  $2\frac{5}{16}$  in.

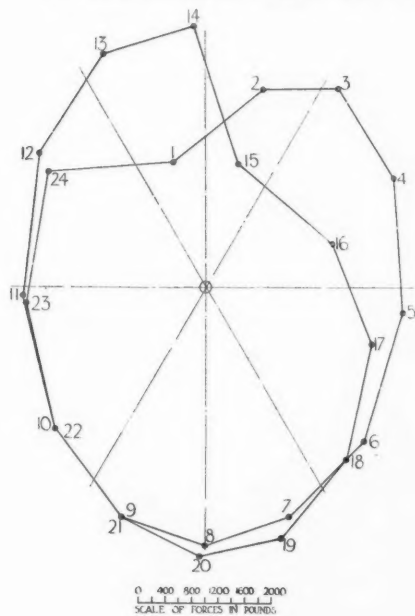


Fig. 6

This is about 15 per cent more than the corresponding length of the six. With equal crankpin diameters for both engines, we must of course obtain the crankpin lengths proportional to the load. In order to verify this the mean total load acting on the crankpin of a twelve has been determined from the diagram in Fig. 6. It is according to expectation 3300 lb. or 15 per cent more than the total load acting on the crankpin of the six.

This and all further comparisons between the six and twelve-cylinder engine are based on the assumption that both engines are running at the same speed. But as we have emphasized before, it is general practice to run a twelve-cylinder engine somewhat faster than a six. If this were taken into consideration, of course the difference between both engines would be more pronounced.

Before we accept the above given crankpin lengths as representing the final values, we will ease our mind with regard to the magnitude of the specific bearing pressure. In case of the six we have a maximum load of 4795 lb. The projected bearing area of a crankpin  $2\frac{1}{8}$  in. diameter and 2 in. long is  $4\frac{1}{4}$  sq. in. This gives a specific pressure of 1125 lb.

In the case of the twelve we have a maximum load per one cylinder (taken from Fig. 4) of 2660 lb. and a projected bearing area of  $2\frac{1}{8} \times 1\frac{5}{32} = 2.46$  sq. in. This necessitates a specific bearing pressure of 1080 lb. The difference between both values is only 4.1 per cent. They are both of such magnitude that they are just about permissible. If the engines are to be used for automobile propulsion then we may bear in mind that maximum speed is generally not maintained for any great length of time. In this case then the loads above given would represent the exception and not the rule. However, automobile engines are quite frequently subject to hard usage when long hills are climbed on high gear.

In these cases the explosive pressures are solely determining the loads on the bearings, because the speed of the engine is then generally so low that the inertia and centrifugal forces are negligible. Assuming an explosion pressure of 380 lb. per square inch for both engines we obtain total explosive loads of 4200 and 2690 lb. for the six and the twelve respectively. In the first case we obtain then a specific

crankpin pressure of  $\frac{4200}{4.25} = 990$  lb., while in the second case

we obtain  $\frac{2690}{2.46} = 1095$  lb. The difference between both en-

gines is here 10.6 per cent in favor of the six. Both loads due to explosive pressure alone are somewhat smaller than those obtained before for high engine speed.

(To be continued)

## Draftsmen Wanted by Ordnance Department

THE Ordnance Department, 1703 New York Avenue, Washington, D. C., requires immediately a large number of draftsmen and designers to work on automobile equipment and also on artillery. These men may either be enlisted, in which case they are given non-commissioned rank, or they may be civilians, in which case their pay ranges from \$1,000 to \$1,600 per year. All men at present not engaged on work of national importance are urged to make immediate application.

## A Permanent Shop Drawing

WHEN layout or detail drawings are used day after day or for months or more, for automobile body drawings, it is not usual to find detail dimensions, and the drawing is scaled when a dimension is wanted. If the drawing is of large size and on blueprint paper or tracing cloth, the change of temperature will contract and expand the paper or cloth, and if measuring a long distance it will be a fraction of an inch longer or shorter.

To overcome this take a sheet of aluminum about  $\frac{1}{16}$  in. thick and a size required for the drawing. Take sandpaper or emery cloth and scratch surface of one side and coat two or three times with white paint of a dull finish. When the paint is dry the surface is ready to draw on. First pencil in drawing, then go over with India ink in any color just as if working on paper or tracing cloth. This will give a drawing that can be scaled any time and will be the same length as supposed to be. This sheet aluminum can be used over and over again.

# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

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## Selling Transportation

THERE is a noticeable tendency throughout the country for manufacturers of passenger cars to engage in the truck business. This has been to a large extent due to the demand on the part of dealers for a truck to be carried in conjunction with the passenger car line. No doubt the demand of the dealers reflects the demand of the public, and from all indication there is going to be a big field for trucks of all capacities in this country during the coming year.

The universal speeding up of our industries due to war conditions has increased the efficiency in every branch of business. With this condition holding true, it is but natural that the truck should come into its own. Those familiar with the industrial conditions in this country have always said that only the surface of the truck business has been scratched, and that we are very far removed from anything like intensive motor truck selling. It seems as if it has required this war to wake us up in a great many directions and, if this awakening continues the way it has been during the past few months, those handling products which are factors in industrial efficiency can hardly fail to reap the benefit.

The question as to whether or not dealers can efficiently handle both trucks and passenger cars has often been debated, and the answer seems to lie in the necessity for either separate men to be put on the truck sales end or the engagement of transportation experts who can advise the truck prospects regarding their requirements, leaving the salesmen who are more trained in closing deals to get the name of the customer down on the dotted line.

Another point that the dealer will have to remember is that while his service problems are probably going to be less with the truck than they are with the passenger car, the success or failure of the sale is going to depend to a large extent on whether the dealer simply sold the customer a truck, or whether he sold him transportation facilities for his business. In all cases where a sale is a success it must be transportation, rather than the truck as a vehicle, that is sold.

## Factory Stock Conservation

IF all the material that is manufactured were used, an ideal condition would prevail. When material that would be perfectly good for one concern is scrapped by another a loss ensues. In the automobile industry alone this amounts to millions of dollars during the course of a year.

Purchasing agents who have over-bought on one line of materials, or stock clerks who have on hand great supplies of material which have become obsolete by changes made in the engineering department, would gladly dispose of this material at the market price. Very likely, in these days of difficulty in locating just what is wanted for immediate use, much of this material would solve a knotty problem for some manufacturer.

The Detroit local branch of the National Association of Purchasing Agents, which was established through the efforts of AUTOMOTIVE INDUSTRIES, has inaugurated an exchange bureau where purchasing agents who are long on any material can get in touch with those who are short on this same material.

### Hundreds of Tons Saved

The result is that hundreds of tons of material which would otherwise be wasted will shortly be getting into the proper hands to the advantage of both parties. The first few days this department was in operation more than 50 tons of stock was transferred from the stockroom of one concern where it was not needed and put into the stockroom of another concern that was having great difficulty in getting that particular material.

If a situation such as this can exist in one locality it is almost inconceivable to think of the great quantities of material which could be exchanged through a national organization. This is a matter which should be taken up at once by an organization such as the N. A. C. C. or the National Association of Purchasing Agents, because it is a wonderful opportunity to conserve materials and one which should not be neglected any longer.



Useless material lying in a stockroom is eating up its own value in interest, it is likely to rust and deteriorate, and when some other plant needs it and cannot get it because it does not know where it is, it amounts to nothing more than a great case of industrial negligence.

## Pneumatic Truck Tires

**E**XPERIMENTS made thus far on heavy-duty trucks equipped with pneumatic tires predict a revolution in truck design. To-day trucks are running regularly between Akron and Boston, carrying casings and tubes, and making the trip in less than express time. On one trip a tractor and semi-trailer was used, mounted on pneumatic cord tires throughout. The front tires were 40 x 8 in.; the drivers 44 x 10 in., and the rear tires 48 x 12 in. Tires up to 54 x 15 in. are commercially possible.

But it is not possible to make a high-speed heavy-duty truck by simply mounting it on special pneumatic tires. The higher car speeds necessitate a larger engine, and because of the suspension a lighter frame may be used. At present trucks are designed for conditions that they meet only 10 per cent of the time, and hence lose in efficiency.

The pneumatic tired truck will be designed with a more flexible transmission, with a transmission that will permit operation at high car speeds and low engine speeds on good roads and low car speeds and high engine speeds on poor roads, in both instances on a full throttle. One manufacturer at least is experimenting in this direction, and has a chain drive truck equipped with a two-speed jackshaft.

## Tests of Fuel Economizers

**I**N recent years a great number of fuel economizers have been placed upon the market and very strong claims have been made for some of them. It has often occurred to us that it would be a very interesting thing if the manufacturers of these devices could be induced to enter them in a competition and tests could be made of them under the direction of competent engineers. Such tests would be particularly useful for the reason that it is a very easy matter to conduct demonstrations which seemingly indicate a considerable gain in power and economy, but actually prove nothing at all.

### Supplementary Air Valves

Most of the economizers are of the nature of supplementary air valves which fasten to the inlet manifold above the throttle valve. Such supplementary air valves produce a beneficial effect if the carbureter without them gives too rich a mixture. The air entering through the supplementary valve increases the amount of mixture entering the engine and if the mixture happens to be of approximately the right richness when diluted by the air entering through the supplementary valve, it is obvious that both the power produced with a certain position of the throttle and the fuel economy

will be increased. However, a truly automatic and correctly adjusted carbureter gives a properly proportionate mixture without the extra air valve. Therefore, in fitting the supplementary valve the carbureter would be adjusted for a richer mixture and comparative tests with and without the supplementary valve, without change in fuel adjustment, there may show a gain in speed and fuel economy. This, however, is not a fair test.

In order to obtain valuable results the engine should be tested both with and without the device at a definite output and speed and in each case the carbureter should be adjusted for maximum economy consistent with good operation throughout a certain range of speed. This would settle the fuel economy question. As to power, only tests at full open throttle are of value. It is obvious that when the throttle is nearly closed the provision of an extra air inlet above the throttle together with an adjustment of the gasoline valve for a richer mixture will result in an increase in power, but this is merely equivalent to opening the throttle further.

## Cold Weather Starting

**T**HIS year the annual trouble of cold weather starting is returning with greater force than ever before. The winter has started early in some sections of the country and motorists in these parts are already experiencing all the effects of the cold weather, combined with the non-volatile fuel. After the engine has been started the devices which are employed readily take care of the combustion of the fuel, but the great difficulty is in getting the first few explosions.

In Detroit, during the last week in October, several cases of frozen radiators were reported, indicating that the winter is already creeping pretty well over the northern half of the country. Along with the frozen radiators were reports of half-hours of hard work in the garage early in the morning. The time has commenced for the manufacturer to realize that the problem of gasoline is just as much or more in getting combustion started as it is to maintain it after firing has commenced. The heated intake manifold and the hot spot and all the other devices work out very well when the engine is going, but they have nothing to do with the first few explosions.

### Appliances for Heavy Fuel

One company is just incorporating a small coil in the float bowl of the carbureter, and others are experimenting with devices of a similar nature. The time has come when appliances to take care of the heavy fuel should be fitted to the car as part of its regular equipment, and the first companies to recognize the necessity are going to profit by increased sales. There is no doubt also going to be a rich field during this winter for manufacturers of good devices at a low price which can be installed on cars of older model and which will take away the difficulty experienced in getting started after the car has been exposed to the cold atmosphere for any length of time.

# □ Latest News of the

## Atmosphere Clearer in Washington

Steel Situation Easier, Plenty of Gasoline and Labor Conditions Better

WASHINGTON, Nov. 22—The passing week witnessed the disappearance of the clouds of immediate passenger car curtailment and other like differences but leaves a haze of uncertainty regarding all steel supplies and shipments to automobile concerns.

The Automobile Industries Committee seems to be working along one line only, namely: Taking up the slack in the automobile industry by arranging for Government work by determining war needs and, by investigation, plans for the near future of the various factories manufacturing facilities.

Many rumors that the industry will be curtailed are current, and one in particular is to the effect that a ten per cent curtailment will be made but none of these rumors can be verified officially and it is at this time impossible to learn if a ten per cent cut would affect all plants equally.

No progress has been made up to this time in securing data, such as a budget of Government needs for steel, or statistics of steel demand made by the various industries.

Previous assuring reports of ample gasoline supply are again made by Fuel Administrator Garfield. Gasoline supplies at this time and for the near future at least do not warrant any arbitrary conservation but rather a reasonable limitation to be self-imposed by owners.

Present activities indicate a general settling down to efficiency by many departments. This Government, a huge and gigantic business—hundreds of times greater than the steel industry—only in the business of a war a few months can naturally anticipate some hysteria, considerable and hasty action of an unwise character in its first days and may be

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### M. A. M. A. to Co-ordinate Activities of Entire Accessory Field

WASHINGTON, Nov. 21—The Motor & Accessory Manufacturers has taken steps to break down all barriers between members and non-members so far as war work is concerned. An effort is to be made to co-ordinate the activities of the entire accessories and parts trade in supporting the Government in its prosecution of the war.

As a first step, the name has been changed to Motor & Accessory Manufacturers' Association. One reason is that this makes Government co-operation easier because the Government recognizes associations as intermediaries between the Government and different trades.

An office has been opened at 604 Ouray Building which is also the location of the National Automobile Chamber of Commerce. Manager L. M. Bradley has located permanently in Washington.

The Automobile Industries Committee will open an office nearby in the Second National Bank Building on Seventh Street and all three organizations will co-operate. Not only will the M. A. M. A. and the N. A. C. C. lend all possible assistance to the Automotive Industries Committee, but it will also be a clearing-house for members of the entire car and parts trade.

The M. A. M. A. has issued a bulletin to all makers asking if they can handle war work and instructing factories to get in touch with A. W. Copland, the accessories member of the Automobile Industries Committee. Each factory is asked to state its preference, requirements and manufacturing facilities.

### Bids for 10,000 Class B Trucks

WASHINGTON, Nov. 20—Manufacturers are now being informed of contract details for the assembly of class B trucks and have been asked for bids. Those making bids will be invited to Washington within the next 2 weeks and will be given contracts at that time for the assembly of 10,000 class B trucks.

## Manufacturers Want Information

DETROIT, Nov. 19—*Special to AUTOMOTIVE INDUSTRIES*—The situation in the manufacturing zone which centers around Detroit is clearing. The sentiment prevails that all the manufacturers require is a clean-cut statement from the government setting forth specifically what it wants from the factories.

Statements made to representatives during the week by such men as C. A. Earl of the Willys-Overland Co., Henry Ford, R. H. Collins of the Cadillac Motor Car Co., E. VerLinden of the Olds Motor Works, and other executives of such companies as Reo, Hudson, Buick and Oakland, cannot help but give the impression that all that is wanted to clear the atmosphere immediately in the automobile industry is a clean-cut proposition from the government.

One of the greatest detriments to a clear understanding of the situation is the rumor crop. Last week in some centers reports were circulated that fac-

## General Motors Gets War Work

Cadillac and Buick to Build Liberty Motors and Other War Material

DETROIT, Nov. 21—Substantial contracts have been given to General Motors Co. for Liberty motors and other munitions. These will be made mainly in the Buick plant at Flint, Mich., and by Cadillac in Detroit. Cadillac has already shipped considerable war material, chiefly cars for army use, this being mainly passenger cars for military staff purposes. Buick and Cadillac are excellently equipped for Liberty motor building, their machine tools being largely suitable for fair sized engines and high accuracy.

### No Danger of a Gasoline Curtailment

WASHINGTON, D. C., Nov. 15—Fuel Administrator Garfield announced to-day that car owners are not in any danger of having gasoline curtailed, and that a survey of the entire country has not shown the oil and gasoline situation to be acute and that for the present no steps would be taken to restrict the use of such fuel for motive power.

The administrator stated that he would, however, inaugurate campaigns to reduce wastefulness of gasoline and to educate car owners how to cut down gasoline consumption.

tories were closing down and laying off men in and about the Middle West. As a matter of fact, one factory was closed for a week for its annual inventory period, and bright and early this Monday morning has started to work again full blast. One company which was reported to be about ready to close its doors has been shipping 105 cars a day for the last two months, and unless some unforeseen circumstance should arise will ship more than this for the next two months.

Cadillac is shipping at the rate of 3000 a month, the Overland about 300 a day, Ford nearly 3000 a day, and other factories in accordance with their output capacity.

The Oakland Motor Car Co. is now producing from 150 to 175 cars a day, the Monroe Motor Co. is now making from 15 to 20 cars a day, and concerns in the 10-a-day class, such as for exam-

(Continued on page 935)



# Automotive Industries □

## Willard New Head of War Board

**Succeeds Scott—R. F. Howe on Aircraft Board—Aerial Transport Committee Formed**

WASHINGTON, Nov. 19—Daniel Willard, president of the Baltimore & Ohio Railroad, has been named chairman of the War Industries Board, succeeding Frank A. Scott, who resigned because of poor health. R. F. Howe of New York, a director of the International Harvester Co., is made a civilian member of the new Aircraft Board.

Mr. Willard will assume his new post immediately. Judge R. C. Lovett, formerly assistant to Mr. Scott, has been serving as temporary chairman of the War Industries Board since the latter's resignation.

The Aircraft Board, to which Mr. Howe has been appointed, includes Howard E. Coffin, General George O. Squier, Col. E. A. Deeds, Col. R. E. Montgomery. Army members and following navy members include Admiral D. W. Taylor, Captain M. E. Irwin, Lieutenant Commander A. K. Atkins.

(Continued on page 934)

### May Reorganize Disco

DETROIT, Nov. 20—At present reorganization of the Disco Electric Starter Co. is being considered and it is possible that the concern may go through the bankruptcy courts. It is expected that creditors will receive an excess of \$.33 on the \$1.

### Government Gets General Vehicle Plant

NEW YORK, Nov. 22—A report is current that the plant of the General Vehicle Co. in Long Island City has been purchased by the Government and will be used for war work. It is stated that the price paid for the plant was \$2,500,000. The General Vehicle Co. is owned by the Peerless Motor & Truck Corp., Cleveland, and the latter concern states that the Long Island City plant will be used for some time in the manufacture of G. V. electric trucks.

### 79,675 Fords in October

DETROIT, Nov. 15—The October production report of the Ford Motor Co. states that 79,675 cars were manufactured, bringing the total for the past 6 months up to 469,135. At this rate, the yearly production will be 938,270 cars, though the estimated production is 900,000. Unless war conditions prevent, the

production for the current fiscal year, which runs from Aug. 1, 1917, to Aug. 1, 1918, will be 1,000,000 cars.

### Automobile Committee Completing Organization

WASHINGTON, Nov. 22—The Automotive Industries Committee is at present forming points of contact with army and navy department heads to get acquainted and to learn the war needs of the Government. Next week it will perfect its organization to include efficiency engineers, industrial engineers, a large clerical force, etc., and will have an organization costing \$75,000 a year to maintain. After the organization is completed, the engineers will travel about the country investigating and analyzing plants to determine the capacity of various plants and the nature of the Government work for which they are best fitted.

### Studebaker Earned 10 Per Cent on Common in 9 Months

NEW YORK, Nov. 20—The Studebaker Corp. earned in the 9 months ended September \$4,132,000, equal to \$10 on the common, after allowing for proportionate preferred dividends and war taxes. Operations for the closing quarter of 1917 are expected to bring approximately \$5,000,000, which after war taxes and preferred dividends would equal close to 12 per cent on the \$30,000,000 common stock outstanding.

### Tractor for Royal Motors

NAPOLÉON, OHIO, Nov. 20—The Royal Motors Co. is getting ready to manufacture a new type of two-wheeled tractor with a kerosene burning engine. It will have a starter. The engine will be 35 hp. geared 93 to 1. The company is now giving the tractor a thorough test and contemplates a 1918 production of 2000 machines.

### Opposes Aeronautic Expositions During War

WASHINGTON, Nov. 21—The National Advisory Committee for Aeronautics is opposed to the holding of aeronautic expositions during the period of the war. By formal resolution it has approved the action of the Aircraft Production Board which has announced that as a matter of general policy, in view of the military situation, it did not encourage the holding of any expositions of aeronautics for the duration of the war. For military reasons no development of new types of engines or plans can be exhibited and the inevitable distraction of interests by manufacturers would not be in the interest of the War Department.

## Bureau Will Allot War Work

**Will Make No Arbitrary Classification of Any Industry as Essential or Non-Essential**

WASHINGTON, Nov. 16—Close co-ordination of the Government's war requirements with the nation's industrial facilities will be developed by the Council of National Defense through the formation of a Bureau of Manufacturing Resources, the personnel of which will shortly be announced. The bureau plans display that the council is taking considerable precaution to guard against an economic unrest and upheaval in calling on American industries for war service.

The plans include the bureau as a part of the War Industries Board and will deal with the situation arising when manufacturers who have facilities are asked to place their productive capacities at the Government's disposal or to turn a part of their facilities to war work. The bureau will attempt to distribute such work so there will be a minimum of unsettlement in any one industry.

The council will make no arbitrary classification of any industry as an essential or non-essential, but will allow the question of curtailment to be decided by the available supply of raw materials, fuel and transportation facilities.

To characterize any industry as non-essential, it was pointed out, might foster unfair public opinion against a legitimate trade. When the demands of the army and navy conflict with industry it is expected that industry will have to give way, but it is expected that the co-operation with the Government will be given by all, and that the new Manufacturing Resources Bureau will be able to apportion war contracts to those factories having an idle capacity rather than to those whose business is at full capacity.

### Priority for Tractors and Farm Machinery

WASHINGTON, Nov. 22—The War Industries Board has given tractors and other farming machinery a rate of priority in transportation second only to war materials. Tractors to be equipped with guns to be used by the army have the highest rating and tractors for farm work are rated with the highest classification for freight not intended directly for military purposes.

## To End Freight Congestion

### War Trucks May Come Over-land in 1918—Freight by Highway

WASHINGTON, D. C., Nov. 17—The newly appointed Highways Transport Committee has been requested by General Chauncey B. Baker of the Quartermaster's Corps to get the highway between Detroit, Mich., and Newport News placed in the best possible condition for a run to be made over it by a motor truck train. The first trip will be made by a company of thirty trucks with a full army personnel. The men will encamp each night along the roadside at wherever the day's run ends. This trip will be a preliminary investigation to determine the feasibility of bringing thousands of new standardized war trucks over the highways in the early part of 1918 and thus relieving railroad transportation from this heavier duty.

Other activities of this Highways Transport Committee headed by Roy D. Chapin, who has taken up his residence in Washington, embrace a question of hauling freight by motor truck over highways for short distances and thereby keeping this freight out of railroad terminals and reducing congestion on them.

The committee will also direct its efforts toward eliminating as much as possible the present waiting time of trucks and drays at terminals owing to their inability to receive or deposit freight rapidly.

The committee will not operate any motor transportation, but will rather through constant investigation of existing conditions and thorough co-operation with other transportation agencies attempt to inaugurate to the fullest extent the possibilities of the motor truck for carrying freight over distances where it can display its economy and helpfulness in the present emergency.

R. C. Hargreaves, who has been doing preliminary work on this subject for some time past for the Storage Committee of the Council of National Defense, has been appointed secretary of the new committee, which is locating in the Munsey Building.

The Highways Transport Committee will soon engage in a study at first hand of the conditions at terminals, such as congestion, and will make its reports on actual, personal knowledge. It will also make thorough first-hand investigations of the military highways to determine the conditions surrounding their use for truck freight transport.

#### Regal to Announce 1-Ton Truck

DETROIT, Nov. 17—The Regal Motor Co. will shortly announce a 1-ton truck that will sell in the neighborhood of \$1,000 and will be distributed through the present Regal dealers. This truck is driven by the standard Regal 4-cylinder engine, as is used in passenger cars, but

with this exception, the truck is entirely new in design. A feature of this truck is to be complete equipment, including starting and lighting system, and a choice of either express or stake body. These bodies are so designed, that for a slight additional expense any one of ten body styles may be constructed. The front tires are 31 by 4 pneumatic and the rear 32 by 4 solid. To date, an experimental truck has run approximately 1000 miles under actual working conditions, and when placed in production but few changes will be made in the original design.

#### \$500,000 AIRPLANE ENGINE STORAGE HOUSE FOR INDIANAPOLIS

INDIANAPOLIS, Nov. 18—The Federal Government has awarded a contract for a concrete airplane engine storage house near the Indianapolis Motor Speedway to cost about \$500,000. The building will be 1200 ft. long and 500 ft. wide.

#### Wagner Axles for War Trucks

INDIANAPOLIS, Nov. 18—The Wagner Axle Co., Anderson, Ind., which recently was organized and occupied the old plant of the De Tangle Motors Co. a few weeks ago, has been awarded a contract by the government to manufacture axles for the U. S. A. trucks. A force of 250 men now at work will be increased to 500 men by the first of the year, when the company expects to be turning out 1000 axles a month. The company's manufacturing space is to be enlarged immediately.

#### Government Order for Madison Trailers

INDIANAPOLIS, Nov. 18—Cecil D. Gibson, president of the Madison Motors Corp., Anderson, Ind., was notified last week that his company is to be asked to manufacture automobile trailers for the government. Mr. Gibson said that his plant is in a position to do much work of this kind, and he now is awaiting orders from the government to begin filling a contract.

#### Used Cars Going Abroad

NEW YORK, Nov. 19—There appears to be an increasing demand for used cars to be shipped abroad. During the past 30 days one dealer has sent a total of 100 cars to Japan and in another instance, occurring during the past two weeks, a shipment of 20 used cars has been sent to Java. In every case, dealers report, foreign buyers approach them, the demand being entirely for open cars. Generally cars are put in first class mechanical condition and in some cases are repainted. It is stated that cars which at present are worth not to exceed \$500 in the market here are bringing as much as \$2,500 in Japan.

#### No Steel Orders Accepted on 8-Hr. Day

WASHINGTON, D. C., Nov. 15—The United States Steel Co., Cambria Steel Co. and Jones & Laughlin Steel Co. have refused to accept any further orders on an 8-hr. day working basis.

## National Show List Increased

### 6 More Exhibitors for New York, 10 More for Chicago—127 New Accessories

NEW YORK, Nov. 19—Additional automobile and accessory exhibitors at the Chicago and New York shows disclose a list of six new automobile exhibitors for New York and ten for Chicago. Allotment of space has been given to 127 new accessory exhibitors, making a grand total of ninety-five makes of cars and 245 exhibitors of accessories. As the list of automobile exhibitors now stands, New York will have eighty-four makes and Chicago ninety.

Automobile exhibitors at New York and Chicago follow:

#### New York.

American Motors Corp., New York.  
Camden Motors Corp., Camden, N. J.  
Doble-Detroit Steam Motors Co., Detroit.  
Harroun Motors Corp., Detroit.  
Moore Motor Vehicle Co., Minneapolis, Minn.  
Stanley Motor Carriage Co., Newton, Mass.

#### Chicago.

Anderson Motor Co., Rock Hill, S. C.  
Comet Automobile Co., Decatur, Ill.  
Dixie Motor Car Co., Louisville, Ky.  
Doble-Detroit Steam Motors Co., Detroit.  
Harroun Motors Corp., Detroit.  
Maibohm Motors Co., Racine, Wis.  
Monitor Motor Car Co., Columbus, Ohio.  
Moore Motor Co., Minneapolis, Minn.  
Olympian Motors Co., Pontiac.  
Pan American Motors Corp., Decatur, Ill.

The new accessory exhibitors are:

#### New York Only

Adams-Williams Mfg. Corp. .... New York  
Alexander, J., Mfg. Co. .... New York  
American Express Co. .... New York  
Armstrong Rubber Co., Inc. .... New York  
Asch & Co., Inc. .... New York  
Atherley, R. J. .... New York  
Auto Pedal Pad Co., Inc. .... New York  
Automatic Carbon Eliminator Co. .... New York  
Automobile Journal Pub. Co. .... Pawtucket, R. I.  
Auto Parts Mfg. Co. .... Milwaukee, Wis.  
Barnes Foundry Co. .... Jersey City, N. J.  
Campbell, A. S., Co. .... Boston  
Carr Universal Auto Body Co. .... New York  
Chadick DeLamater Corp. .... New York  
Coe-Stapley Mfg. Corp. .... New York  
Common-Sense Mfg. Co. .... Newark, N. J.  
Corcoran Mfg. Co. .... Cincinnati, Ohio  
Cox Brass Mfg. Co. .... Albany, N. Y.  
Crew Levick Co. .... Philadelphia, Pa.  
Eastern Super Spark Co. .... New York  
Electric Automatic Cigar Lighter Co. .... New York  
Essex Rubber Co., Inc. .... Trenton  
Faw, J. H., Inc. .... New York  
Foot Air Accelerator Co. .... New York  
Fordham Chemical Co., Inc. .... Long Island City  
Frasse, Peter A., & Co., Inc. .... New York  
Grossman, Emil, Mfg. Corp. .... Brooklyn  
H. & N. Mfg. Co., Inc. .... New York  
Hart-Bell Co. .... New York  
Holmes, Geo. L. .... New York  
Holophane Glass Co., Inc. .... New York  
Hoover Tire Carrier Corp. .... New York  
Hoover, W. H., Co. .... New Berlin, Ohio  
Houptert Machine Co. .... New York  
Hydro-Eye Co. .... New York  
International Coat Co. .... New York  
J. & B. Mfg. Co. .... Pittsfield, Mass.  
Jauhazs Carburetor Co. .... New York  
Keystone Rubber Mfg. Co. .... Erie, Pa.  
Lacharnay Carburetor Co. .... Paterson, N. J.  
Langlands, Eric .... New York  
Lowe Motor Supplies Co. .... New York  
Many-Use Oil Co. .... New York



Martin, James .....New York  
 Marvel Accessories Mfg. Co.....Cleveland  
 Miller, Chas. E.....New York  
 Moreau & Pratt, Inc.....New York  
 Motor Car Equipment Co.....New York  
 Motor Highway .....Lincoln, Neb.  
 Mutty, L. J., Co.....Boston, Mass.  
 Nugo Device Corp.....New York  
 Petry, N. A., Co., Inc.....Philadelphia, Pa.  
 Play Safe Co.....Brookville, Pa.  
 Pouvaillsmith Corp.....Poughkeepsie, N. Y.  
 Primolite Sales Co.....Westfield, N. Y.  
 Rich, H. C., Auto Accessories Co..New York  
 Smith Signal Corp.....New York  
 Speer Carbon Co.....St. Mary's, Pa.  
 Stanley, John T., Co., Inc.....New York  
 Stewart, F. W.....Chicago  
 Story Corp. ....New York  
 Stroock, S. & Co.....New York  
 Super Lighting Co., Inc.....New York  
 Triple Action Spring Co. of N. Y., Inc.,  
 New York  
 U-Auto-C Corp. ....New York

## Chicago Only

Adamson Mfg. Co.....East Palestine, Ohio  
 Johnson Automobile Lock Co...Chicago, Ill.  
 L. Lawrence & Co.....Newark  
 Mason, Arthur C., Inc.....Paterson, N. J.  
 Ogden Mfg. Co.....Plymouth, Ind.  
 Sipp Machine Co.....Paterson, N. J.  
 Syracuse Wrench Co.....Syracuse, N. Y.  
 Tobey Polish Co.....Chicago  
 Tuthill Spring Co.....Chicago  
 Wales-Adamson Co. ....Chicago

## Both

Advance Automobile Access. Corp...Chicago  
 Amazon Rubber Co.....Akron  
 Amer. Chauffeur Pub. Co.....Cincinnati  
 American Sleeve-Valve Motor Co..New York  
 Armstrong Cork Co.....Pittsburgh  
 Auto Gear Co., Inc.....New York  
 Automatic Transmission Co., Inc..New York  
 Automobile Devices Co.....Philadelphia  
 Brewer-Titchener Corp. (Crandall, Stone  
 & Co. ....Binghamton, N. Y.  
 Chilton Co. ....Philadelphia  
 Class Journal Co.....New York  
 Connecticut Clock Co.....Hartford, Conn.  
 Curtis Pneumatic Machinery Co....St. Louis  
 Detroit Kerosene Carbureter Co....Detroit  
 Eastern Rubber Co.....Philadelphia  
 Essenkay Products Co.....Chicago  
 Eureka Rim Compressor Co..Addison, N. Y.  
 Fulton Co.....Knoxville, Tenn.  
 G. L. W. Spring Oiler Co...San Diego, Cal.  
 H. & D. Co., Inc.....Goodland, Ind.  
 Holt-Welles Co., Inc.....New York  
 Horseless Age .....New York  
 Humboldt Machine & Stamping Co..L. I. City  
 Improved Gauge Mfg. Co.....Syracuse  
 Inland Machine Works.....St. Louis  
 Interstate Electric Co.....New Orleans  
 J. H. Tonneau Shield Co.....New York  
 Jiffy Jack Co.....Cleveland  
 K-W Ignition Co.....Cleveland  
 Lane Bros. Co.....Poughkeepsie, N. Y.  
 Lubriko Co.....Philadelphia  
 McQuay-Norris Mfg. Co.....St. Louis  
 Merrimack Mfg. Co.....Lowell, Mass.  
 Militaire Motor Vehicle Co.....Buffalo  
 Motor .....New York  
 Motor Car Spring Co.....New York  
 Motor Mechanics .....Cleveland  
 Motor Vehicle Pub. Co.....New York  
 Prismolite Co. ....Columbus, Ohio  
 Saferlite Lens Co.....New York  
 Sharp Spark Plug Co.....Cleveland  
 Spencer Metal Products Co....Spencer, Ohio  
 Sterns Tire & Tube Co., Inc.....St. Louis  
 Twin Fire Spark Plug Co.....Detroit  
 United Engine & Mfg. Co.....Hanover, Pa.  
 U. S. Air Compressor Co.....Cleveland  
 U. S. Gauge Co.....New York  
 Universal Tool Co., Inc.....Detroit  
 Wasson Piston Ring Co..New Brunswick, N. J.  
 Weaver Mfg. Co.....Springfield, Ill.  
 West Steel Casting Co.....Cleveland

## Denver Dealers Sell 30,650 Cars

### Gain of 50 Per Cent—Biggest Increase in New Mexico

DENVER, Nov. 16—Approximately 30,650 cars have been bought thus far in 1917 by Colorado, New Mexico and Wyoming, which comprise the main territory supplied by Denver distributors. This is a gain of 50 per cent over last year's total registration of 60,224 for the three states. There is now one car for every eighteen people. The 1917 increase is made up as follows: Colorado, 21,130, or 47 per cent; New Mexico, 5645, or 68 per cent; Wyoming, 3875, or 54 per cent.

The reason for the heavy sale of cars this year, and for the distributors' strong hopes regarding future years, is indicated by a brief survey of industrial conditions in the district.

#### Industrial Conditions

The total value of Colorado products for 1917 is estimated at \$408,000,000, as against \$338,484,300 for 1916, a gain of nearly \$70,000,000. New Mexico's bank resources are \$47,778,167, an increase of \$11,115,841 over a year ago, while the assessed valuation of all classes of property in the state is now \$363,000,000, an increase of \$54,000,000 over 1916. Of this amount, motor cars represent a valuation of \$2,398,234, a gain of \$935,801. The license fees in that state total thus far this year more than \$80,000. New Mexico shows \$45,272,000 in agricultural products this year, a \$5,000,000 gain, and livestock and mining products estimated at \$46,800,000 and \$43,700,000 respectively (no estimate for 1916 output). Wyoming gains have been similar in a general way in oil, mining, agriculture, livestock and manufacturing, although exact figures are not at hand since the close of 1916. That year showed a gain of 2,030,000 barrels and \$10,150,000 in oil alone, for example, and a gain of nearly \$17,000,000 in assessed property valuation, over 1915.

Colorado produced 10,600,000 bushels of corn, 13,536,000 bushels of wheat, 9,150,000 bushels of potatoes and 1,364,000 bushels of beans this year, as against respectively 7,362,000 bushels, 11,885,000 bushels, 6,900,000 bushels and 424,000 bushels. Price gains are shown by \$1.35 a bushel as against 76 cents, for corn, and \$7.75 per cwt. as against \$5, for beans.

#### Universal Headlight Law Discussed with S. A. E.

NEW YORK, Nov. 15—A big step forward toward the enactment of a universal law regulating automobile headlamps was taken this afternoon when representatives from the legislature of seven eastern states met in New York to discuss the subject with experts appointed by the S. A. E.

The Society recommends that the fol-

lowing definition, if conformed with, would meet the conflicting requirements of insuring sufficient light for safe driving together with total absence of glare. The Society's recommendation is:

"The headlamps shall be so arranged that no portion of the direct reflected beam cone of light, when measured 75 ft. ahead of the headlamps, shall rise above 42 in. from the level surface of the road on which the vehicle stands, under any condition of loading; nor shall any portion of the direct reflected beam cone of light rise, beyond the 75 ft. distance, more than 12 in. above the center of the headlamp."

The representatives of the states discussed mainly how it would be possible to persuade motorists to conform to the law and how the law could be easily enforced without the use of elaborate machinery for testing the lamps. It was shown that the enforcing of such a law was quite simple, and the final details of procedure are now being worked out.

#### Headlamp Trouble

It was agreed that at least 75 per cent of headlamp trouble was due to the failure on the part of the driver to realize that a bent bracket or wrongly adjusted lamp would necessarily give an imperfect light. Nearly all automobilists are provided with adjustments which enable the lights to be set correctly. The immediate need appears to be to drive home to the motorist that he can by taking very little trouble obtain for himself a better driving light coupled with elimination of the glare which by endangering others also endangers himself.

#### Marmon Prices Higher Dec. 1

NEW YORK, Nov. 19—An increase in prices on Dec. 1 will be put into effect by the Nordyke & Marmon Co., Indianapolis. On that date its closed bodies will be from \$450 to \$1,100 higher and its open cars \$400 higher. The Sedan will be raised \$450 and will sell at \$5,000 on Dec. 1. The landaulet will be \$550 higher and will sell at \$4,650, and the limousine \$450 higher, selling at \$4,550. The open cars will sell at \$3,550, being raised \$400.

#### Cole Prices \$200 Higher Jan. 1 Two New Models

NEW YORK, Nov. 19—The Cole Motor Car Co., Indianapolis, will raise its prices \$200 on Jan. 1, and will bring out around show time two new sport models, of 4-passenger and 7-passenger capacities. The new prices will be \$2,195 for the 2-passenger roadster. The 7-passenger touring car will sell for \$2,195; the coupe for \$2,695; and the 864, 865 and 866 Sedan at \$2,895, \$2,795 and \$2,995 respectively.

#### Deppe to Talk on Gasoline Problem

NEW YORK, Nov. 20—W. D. Deppe will read a paper, entitled "Solving the Gasoline Problem," at a meeting of the Metropolitan Section of the Society of Automotive Engineers, Nov. 22.

## No Storage Space in Detroit

Want Government Warehouse  
In Which to Keep War  
Materials

DETROIT, Nov. 19—During the past three weeks more than 200 Detroit manufacturing concerns have inspected specifications for bids on war materials at the Board of Commerce, and in most cases bids have been submitted. Of these several were manufacturers of automobiles and kindred products, though not in many cases were the bids accepted. The reason for this doubtless is that few of them were for quantity orders so that it would be worth while to take over the contracts. J. H. Cullen, industrial secretary of the Detroit Board of Commerce, is at present in Washington conferring with the purchasing departments of the various bureaus determining how orders may be apportioned among the Detroit manufacturers.

One of the problems facing manufacturers of war contracts here is in obtaining storage space for the war material. A resolution has been passed at a special meeting of the manufacturers to ask the Government to provide a warehouse for all munitions manufactured. The goods will be placed here and a receipt obtained after which the manufacturer may receive his money from Washington. This step is deemed necessary in view of the fact that transportation difficulties are liable to increase during the winter so that the goods may not be readily moved and because many concerns require immediate capital for continuing their work. This resolution will be forwarded to the proper authorities in Washington at an early date.



DANIEL WILLARD

Newly Appointed Head of the War  
Industries Board

### Willard Heads New War Board

(Continued from page 931)

Applications of aircraft to civil purposes will be undertaken by a national advisory commission for aeronautics through a special committee on civil aerial transport. The new committee supersedes the trial mail service committee and will co-operate with similar organizations of other nations devoting itself to utilization of military airplanes and aviators after the war. The names of the committee are: Chairman, Dr. W. F. Durand; Dr. S. W. Stratton, Director of the United States Bureau of Standards; Prof. C. F. Marvin, Chief of the United States Weather Bureau; Lieutenant Colonel V. E. Clark of the Signal Corps and Lieutenant Commander J. H. Towers, U. S. N.

## More Freight Cars Needed

Transportation Problem This  
Winter Will Have To  
Be Solved

WASHINGTON, Nov. 21—The transportation situation is becoming productive of growing public uneasiness and agitation. Both the public and the railroad management must courageously face the fact that under the trying conditions which will develop this winter it will probably be impossible for the carriers to handle all the traffic which the shipping public can offer. The number of unfilled requisitions for freight cars having largely declined between May 1 and Sept. 1 in spite of a vast augmentation of traffic showing an increase on Oct. 1 and a further increase on Nov. 1. The statement shows that the United States Railway handled 16 per cent more freight traffic in the first 5 months of the war time than in the same months of 1916 when all freight records were broken. The situation is similar to that in other industries. The steel manufacturers cannot produce all the steel needed, the coal mines cannot produce all the coal needed. The time may be almost here when it will be necessary to distinguish in railway transportation between things that are essential and things that are not essential.

The Railroad War Board has furnished to Judge Lovett, the Government Director of Priority, and to Dr. Garfield, Government Fuel Administrator, at their request a list compiled by a committee of railway traffic officers showing commodities which are regarded from a transportation viewpoint as non-essential under present conditions. One part of this list

## Atmosphere Clearing in Washington

(Continued from page 930)

depended upon to eventually attain a steady conservative course. For example, there is much talk of lack of skilled labor for certain industries. This is true. Many industries making war needs are unable to secure the men required for huge output. But inquiry here reveals the need for other factors besides workers. It displays first a need for increased output of materials and second a need for a complete detailed tabulation of the exact numbers of men required together with the kinds of skilled labor that is short. This cry for workers and the demand for them from every other industry created injury. It caused men to flock from plant to plant. It produced financial depression in certain industries fearful of curtailment. The present attitude, following discovery that there are not yet sufficient ship bottoms to carry a maximum production, nor supplies for maximum manufacture, nor even a concise knowledge of labor requirements, takes these matters into consideration with a resultant determination to first

arrive at a positive foundation before taking hasty action.

News dispatches telling of Henry Ford's appointment to the Shipping Board over-stated that matter. Mr. Ford instead of acting as assistant vice-president as reported will be an adviser on standardization of small parts, visiting Washington only when occasion demands. The Ford company is already engaged in the manufacture of certain parts.

Visitors to Washington continue to be numerous. Among those here in the past week, seeking either to aid the Government or to secure war contracts, were:

Henry Ford, Ford Motor Co.  
Harold N. Wills, Ford Motor Co.  
E. H. Brown, General Aluminum & Brass Mfg. Co.  
C. E. Callender, Olympian Motors Co.  
G. A. Brockway, Brockway Motor Truck Co.  
C. J. Pilliod, Jr., Steel Products Co.  
W. C. Keys, Standard Parts Co.  
Karl Probst, Milburn Wagon Works.  
H. M. Jewett, Paige Motor Car Corp.  
D. McCall White, Cadillac Motor Car Co.  
E. A. Scher, King Motor Car Co.  
R. E. Wallace, Anchor Top & Buggy Co.  
Carl Hinkley, Hinkley Motors Corp.  
E. T. Moon, Moon Motor Car Co.

Carl Schmid, Star Iron Works.  
W. B. Hurlburt, Hurlburt Motor Truck Co.  
O. E. Stoll, General Motors Truck Co.  
W. J. Peete, Goodyear Tire & Rubber Co.  
C. O. Miller, Olds Motor Works.  
E. R. Gardner, Velle Motor Vehicle Corp.  
M. W. Larkin, United States Gauge Co.  
R. H. DeMott, SKF Ball Bearing Co.  
O. A. Griffiths, Cleveland Brass & Copper Mills.  
B. F. Wright, Federal Motor Truck Co.  
A. D. Elmer, Cadillac Motor Car Co.  
C. B. Parsons, Parsons Mfg. Co.  
W. T. Jones, Edmund & Jones.  
W. F. Tant, Michigan Stamping Co.  
S. V. Levenstein, Schwarz Wheel Co.  
C. E. Bement, Novo Engine Co.  
R. H. Scott, Reo Motor Car Co.  
J. J. O'Neil, Laminated Shim Co.  
A. Schaeffer, Central Steel Co.  
R. M. Newbold, Four-Wheel Drive Co.  
A. C. Reeves, N. A. C. C.  
S. M. Williams, Garford Motor Truck Co.  
W. A. Gibson, Hayes Wheel Co.  
J. T. Adams, Packard Motor Car Co.  
C. L. Barnes, Barnes Foundry & Mfg. Co.  
A. H. Rice, Studebaker Corp.  
H. Smith, Lanston Monotype Co.  
A. P. Gramm, Gramm-Bernstein Co.  
O. J. Cessna, Albion Malleable Iron Co.  
H. R. Averill, National Motor Car Corp.  
E. I. Dall, Dall Steel Products Co.  
M. E. Morris, Goodyear Tire & Rubber Co.  
A. J. Gurnully, Ajax Rubber Co.  
John Tenny, Howe Rubber Co.  
H. R. Frate, National Gas Engine Assn.  
G. H. Kelly, White Co.  
C. M. Campbell, Courtney Tractor Co.  
J. W. Gray, Gray Tractor Co.



takes up 450 commodities, the transportation of which it is believed could be dispensed with without considerable inconvenience to the public. Another part contains about seventy-five commodities which it is believed could be dispensed with but not without some inconvenience. The Priority Director and the Fuel Administrator are going to determine how many of these commodities will be denied transportation.

The Railroad Board says: "We have no doubt if non-essential commodities are eliminated the railways can transport all commodities required by the Government for war purposes and by the people for their sustenance and comfort."

Those responsible for the operation of the railways do not wish to be understood as conceding that the transportation lines have run the limit of their capacity. They are still increasing the amount of traffic they are handling and with greater exercise of skill and energy by the railway officers and increased cooperation by the shipping public and the Government officials, including the regulating authorities, the great service rendered can still be largely augmented.

#### Uneasiness in Chicago

CHICAGO, Nov. 19—The present uncertainty in the industry as to what the Government may do toward curtailing production has caused a decided unrest among dealers. The Mitchell sales organization is dispelling any doubts on the part of its dealers by urging that even should passenger car production be seriously curtailed there would be plenty of work and even if all factories should close dealers could keep going until after the war through service on the five million cars now in the country.

#### Homan Now a Major

CLEVELAND, Nov. 19—Major C. C. Homan, formerly vice-president in charge of purchasing of the Hal Motor Car Co., is now under orders from the War Department.

## New York Business Is Satisfactory

### Stock of Used Cars Normal —Shipping Conditions Could Be Better

NEW YORK, Nov. 19—Business conditions appear quite satisfactory to New York dealers. The stock of used cars on hand is normal for this time of year, but even where a larger number than usual is being held the dealers are not worried.

In fact, there is in many cases a deliberate attempt at storing used cars, for the belief is general that there will be a demand in the spring unprecedented in extent and sufficient to materially increase market values.

Practically all dealers are experiencing difficulty in getting shipments of new cars, and in this field, too, there is quite a general attempt for dealers to get as many new cars as possible and store them. For example, one dealer expects to receive shortly 1000 cars which will be stored for the spring. Dealers figure that it will pay them well to buy storage space for this purpose.

Among the dealers in higher priced cars the sentiment is fairly general that the number of sales shows a normal increase over October of last year, but that the amount of money taken in is less. In other words, special jobs are not selling nearly as freely as they would under normal conditions.

#### Makers Want Information

(Continued from page 930)

ple the Jordan Motor Car Co. in Cleveland, are having the largest day shipments in their history right now. This concern shipped 23 cars on Nov. 2, its normal output being 10 a day.

The Studebaker Co. at South Bend reports that its sales for November so far have been better than those of the first

two weeks of October, and believes that the October slump was due to the second Liberty Loan.

### Middle West Trade Conditions Could Be Better

CHICAGO, Nov. 17—Trade conditions in this territory have undergone no changes of importance during the past week. Sales and prospects of sales as a whole in the passenger car field, while not so good as could be wished, are as good as could be expected. This is the general opinion of the industry around Chicago and Indianapolis and other manufacturing centers.

Retail sales in the West and Central West are much better than in the East, and in the South sales are unusually strong. The country over, however, according to factory reports is seriously behind in retail orders. Retailers are not stocking up as they have in previous years. Bankers are tightening up on loans to retailers, insisting that both new and second-hand stocks be moved before money is borrowed for further purchases.

Closed cars are not moving as rapidly as they should. With some of the big body builders devoting their plants to aircraft production and other work, there should be a shortage of closed car bodies under normal conditions, but there are plenty of bodies to meet the demand.

There is no widespread laying off of men as was rumored would take place. One Indianapolis concern, in particular, is producing more cars than it ever produced before and is way behind its orders.

#### Dodge and Ford Attorneys Meet

DETROIT, Nov. 20—The Dodge Brothers and Ford attorneys met to-day as per ruling of Judge Hosmer in the recent decision to discuss the situation before the final decision next week. Most of the time was spent on discussing who would bear the expense of the suit.

## Buses Deliver Army's Meat

(Continued from page 906)

m.p.h. The gearset provides three forward speeds, the final drive is by internal gears. Single and dual solid rubber tires are fitted. All the older vehicles have transformed passenger-carrying bodies. All internal fittings have been taken out and fore-and-aft racks with meat hooks fitted up. Those originally calculated as sufficient proved to be too weak when carrying full load over rough roads, and in consequence had to be strengthened. Windows have been replaced by fine wire gauze screens. These buses have a big rear platform, which has been retained, with the addition of a solid rear door. Without a door, or with gauze panels the suction at the rear caused too much dust to be drawn into the vehicle, to the detriment of the contents. The rear platform, being lower than the main frame, gives an easy entrance and facilitates loading. It is also made use of to carry reserve gasoline and the drivers' kits.

The body space is 176 in. in length, with a maxi-

mum width of 88 inches. Under average weather conditions the fuel consumption is 45 litres per 100 kilometres, which is at the rate of about 5.2 miles to the American gallon. This is practically the same consumption as when operating on the streets of Paris. On city service the fuel used was either benzol or a 50 per cent mixture of benzol and alcohol. On war service gasoline is employed. In connection with fuel consumption winter service on inferior road surfaces will increase the gasoline consumption 20 to 30 per cent above the normal for summer duty. This is shown in the records kept for each section on the front.

In addition to the type of meat-carrying automobile described, there are a certain number in use for the necessity of smaller units which cannot be economically supplied by a vehicle carrying nearly 4000 pounds. These automobiles are 30 hp. touring car chassis fitted with twin pneumatic tires and having a special meat-carrying body. Their number is comparatively small.

## Curtiss Sales Total \$9,950,207

**\$2,713,639 Operating Profit  
for 9 Months Ending  
Sept. 30**

NEW YORK, Nov. 19—Gross sales of the Curtiss Aeroplane & Motor Corp. and subsidiaries for the 9 months ended Sept. 30 totalled \$9,950,207, divided as follows:

Sales of aeroplanes.....	\$6,588,806
Aeroplane parts .....	1,433,101
Sales of motors .....	1,405,689
Motor parts .....	495,715
Miscellaneous .....	26,896
Gross sales .....	\$9,950,207
Discounts and commissions.....	72,926
Net sales .....	\$9,877,281
Manufacturing cost .....	7,163,642
Operating profit .....	\$2,713,639
Selling, general expenses, etc.....	764,059
Balance .....	\$1,949,579
Other income .....	152,453
Gross profit .....	\$2,102,032
Bond and other interest.....	209,866
Royalties .....	70,600
*Net profit .....	\$1,821,566

\*After allowing \$315,000 as dividend for 9 months on the \$6,000,000 preferred stock this leaves \$1,506,566 for the 217,000 shares of common stock or \$6.90 a share for the period. This is at an annual rate of \$9.20 a share for the junior issue which is without par value. No allowance has yet been made for war taxes.

Balance sheet of the Curtiss Aeroplane & Motor Corp. and subsidiaries, as of Sept. 30, 1917, compares with statement of Nov. 30, 1916, as follows:

ASSETS		
	Sept. 30, '17	Nov. 30, '16
Land, buildings, equip- ment, etc. ....	\$3,675,918	\$1,163,711
Cash .....	142,101	280,256
Accounts and notes rec., less reserve .....	1,992,501	1,063,565
Inventories, less reserve .....	6,476,749	2,470,982
Investments .....	37,170	.....
Deposits on contracts..	.....	103,743
Patents and good will.	5,853,461	7,825,590
Deferred charges.....	337,268	287,773
Total .....	\$18,515,169	\$13,195,621
LIABILITIES		
Capital stock.....	\$7,087,700	\$6,750,000
Bonds .....	3,773,000	.....
Notes .....	.....	4,000,000
Accounts and notes payable .....	4,422,030	615,934
Other current liabilities	106,092	.....
Minority interest, To- ronto Co. ....	.....	58,689
Accrued interest, taxes, wages .....	159,970	.....
Reserve for contingen- cies .....	96,429	35,000
Deposits on contracts.	762,709	911,524
Profit and loss surplus	2,107,139	824,474
Total .....	\$18,515,169	\$13,195,621

\*Depreciated valuation.

†Comprises \$6,000,000 preferred stock and \$1,515,000 common stock, less \$427,300 (85,460 shares) with trustee for conversion of notes.

The new plant of the company will be completed before the end of this week. Beginning Jan. 1 the Curtiss company will be turning out more than \$9,000,000 of airplanes and parts a month. Of this record business \$4,000,000 will be taken care of in the old plants and \$5,000,000 in the plants to be completed this week.

Work has already begun on machines for the Government in several of the departments. The 6 months' business is estimated at \$50,000,000. It is estimated that the company will be in a position by the close of next year to turn out close

to \$20,000,000 of airplane material a month or at an annual rate of \$240,000,000.

### Administrator of Industries Coming

WASHINGTON, Nov. 20—There is going to be an administrator of industries in the near future, according to declaration by Government officials to-day. He will handle all labor matters, will have control of supplies, priority of labor curtailment for non-essential industries and standardization of labor conditions. He will probably be a man who is neither a capitalist nor a labor representative.

### Milwaukee Motor Creditors' Meeting Nov. 30

MILWAUKEE, Wis., Nov. 17—The affairs of the defunct Milwaukee Motor Co., Milwaukee, Wis., which went into bankruptcy on June 30, 1913, will be wound up at a final meeting of creditors Nov. 30. A final dividend of 4 per cent has just been declared and ordered paid, making a total disbursement of dividends amounting to 39 per cent on allowed claims aggregating \$267,993. A balance of \$22,219 remains, and this probably will be disbursed.

### Campbell Motor Designs New Four

NEW YORK, Nov. 19—The Campbell Motor Car Co., Kingston, N. Y., has designed and constructed a new model to be known as the Campbell Four, selling at \$835, with the following general specifications: 110 in. wheelbase, unit power plant, engine 3 3/4 by 4, 24 hp., Hotchkiss drive, full floating rear axle and electric starting and lighting.

The company has practically completed its reorganization. Its capital consists of \$1,000,000 first preferred 6 per cent cumulative, \$250,000 in second preferred and \$1,750,000 common.

### Pilot Adds Demountable Sedan and Coupe

RICHMOND, IND., Nov. 10—The Pilot Motor Car Co. has brought out a new demountable sedan and coupe. The sedan seats five and the coupe four passengers, the price of both being \$1,520. Either top may be purchased separately for cars already in service at \$250. Both are mounted on the standard six-cylinder chassis.

### Sedan Model for Elgin

CHICAGO, Nov. 20—The Elgin Motor Car Corp. has brought out a five-passenger sedan selling at \$1,645. The car has a patented adjustable steering wheel 18 in. in diameter.

### New Canadian Maxwell Plant Progresses

WINDSOR, ONT., Nov. 19—Work is progressing on the Canadian assembling plant of the Maxwell Motor Co. and the plant will be ready for use about Jan. 1. The first of the concrete was poured this week. At present arrangements are being made with the custom officials to determine the rate of tariff on parts that will be shipped to Canada for assembly.

## Four Stewart Track Models for 1918

**Of 3/4, 1, 1 1/2 and 2 Ton Capac-  
ity—Milwaukee, Continen-  
tal and Buda Engines**

BUFFALO, Nov. 19—Four models will comprise the line of the Stewart Motor Corp., Buffalo, N. Y., for 1918, of 3/4, 1, 1 1/2 and 2 tons capacity. In the main the continued models are the same as the present ones, but there are a few changes. Prices are: 3/4-ton, \$750; 1-ton, \$1,295; 1 1/2-ton, \$1,695, and 2-ton, \$2,195.

The 3/4-ton now uses a Milwaukee engine and the 1 1/2-ton a Continental, while the two larger models remain Buda equipped. The bores and strokes are respectively, 3 1/2 x 4 1/4, 3 1/2 x 5 1/2, 3 3/4 x 5, 4 1/2 x 5 1/2.

### Standard Parts

Standard parts are used such as Bush radiators, Detroit springs, Zenith carburetors and Berling magnetos. The smaller model has a dry disk clutch made by the Mechanics Machine Co. and a unit gearbox from the same concern, while the steering gear is a C. A. S. The larger models have a Fuller dry disk clutch, Fuller gearbox in unit with the engine, and Ross steering gear.

Wheelbases are respectively 110, 118, 140, 156 in. Tires are 32 x 4, 34 x 4 1/2, 34 x 4. The last has duals in the rear. The first two are pneumatic. Gear ratios are 6 to 1, 7 to 1, 7 to 1, 9 to 1.

A description of the 1 1/2-ton, the leader, reflects the characteristics of the line. The engine is a 35 hp. four-cylinder L-head design with three-bearing crankshaft. It has a constant level oiling system maintained by plunger pump. The powerplant is a unit with a dry-disk clutch and three-speed selective gearset, all suspended on three points. Ignition is by Berling high-tension magneto with fixed spark, and the carburetor is a vertical Zenith controlled by an accelerator. Cooling is by thermo-siphon with cast tank, armored radiator and 16-in. steel fan mounted on ball bearings.

### Dry-Disk Clutch

The clutch is a dry-disk, Raybestos against steel, and drives a transmission with gears of double heat-treated nickel steel. Annual ball bearings are used throughout.

The drive shaft is tubular with two universals. The front axle is a drop-forged I-beam with nickel steel steering spindles, and large roller bearings in the hubs.

The frame is a straight side channel type heat treated. The overall length is 204 in., depth 5 1/2 in. and width 2 1/2 in., making it suitable for 10-ft. bodies.

Artillery wheels are used with twelve spokes in front wheels and fourteen spokes in the rear. Firestone or United States solid pressed-on tires are used.

Brakes are external contracting. The service brake acts on the rear wheel



drums and the emergency brake on the propeller shaft. Both bands are lined with Raybestos.

The chassis is painted standard Stewart red with fenders and runningboards in black. Equipment includes driver's seat and cushion, side and rear oil lamps, channel bumper, mechanical horn, tool kit, tool box and front fenders.

#### Wisconsin Tractor Absorbs Shaw Motor

SAUK CITY, Wis., Nov. 17—The Wisconsin Tractor Co., Sauk City, Wis., has increased its capital stock from \$50,000 to \$100,000 in order to absorb local holdings of stock in the Shaw Motor Co., Chicago, and to provide additional capital to handle several large orders. The company was organized about 18 months ago by McFarland & Westmont, Lodi, Wis., inventors of an all-steel tractor. The company moved to Sauk City, having been able to make a lease on the machine-shop and foundry erected by Sauk City capital for the use of the Shaw Motor Co., but never occupied by that concern because of a change of its plans. By the increase in capital the tractor concern virtually becomes owner of the buildings and real estate. Among the orders now in process of manufacture is one for twenty-five tractors for delivery to England. Repeat orders amounting to 100 machines are contingent upon the contract.

#### Sheldon Axle Places N. Y. Distributer

NEW YORK, Nov. 8—The Chadick-Delamater Corp. will represent the Sheldon Axle & Spring Co. for the distribution of parts in this city and vicinity. A complete stock of parts will be carried at a service station, 159 West Twenty-fourth Street.

## No Change in Stock Situation

### Little Demand—General Motors Strong on Record Report

NEW YORK, Nov. 20—Automotive issues, with very few exceptions, retain the same standing that has characterized this class of stock during the past month. Gains have been made by several of the stocks, but there has been no united action to warrant the statement that these stocks will maintain a steady rise or that the other stocks will go higher in the near future. The bears last week were treated to a surprise by the record statement published by General Motors. No issue on the automotive list is held any more closely than General Motors, and the stock is watched so closely, in fact, that all sales or purchases are kept strict track of. Consequently when the statement of the October earnings came along, those who had bought short on the stock found that the strings had been pulled by calling in the borrowed stock. As a result a premium was paid for the use of the stock. No serious effort was made, however, to squeeze the shorts in this stock, but \$37.50 per 100 shares was exacted for its use over night. General Motors went up nearly 8 points last week. The rest of the issues were weak.

#### DIVIDENDS DECLARED

Youngstown Sheet & Tube Co., quarterly of 2 per cent, plus an extra 3 per cent, on common stock, and the regular

quarterly of 1½ per cent on preferred, payable to stockholders of record Dec. 20 or Dec. 31. In all, this makes a dividend of 17 per cent on the common stock for 1917.

#### Columbia Adds a Trailer Outfit Truck Price Higher

PONTIAC, Nov. 19—The Columbia Motor Truck & Trailer Co. has brought out a 6-ton tractor and semi-trailer outfit comprising a Columbia 2-ton truck with a shortened wheelbase of 114 in. and a two-wheeled semi-trailer with 36 by 6 solid rubber pressed-on tires. A Martin rocking fifth wheel is mounted on the rear of the tractor to carry the front of the 16-ft. trailer. In addition, the company will bring out for the 1918 trade a four-wheel, 4-ton reversible trailer. The 2-ton truck is continued without change but the price has been increased from \$1,750 to \$1,950.

#### New Schebler Carbureter for Fords—\$17 Complete

INDIANAPOLIS, Nov. 17—The Wheeler & Schebler Co. has placed on the market a new carbureter equipment for Fords which is styled Model A. It sells complete for \$17. The new carbureter is a plain tube type with no moving parts and incorporates the principle of the Pitot tube, an improved type of gasoline nozzle which furnishes a rich mixture for starting and a thinned out mixture for normal running. There are two adjustments, one for slow speed and one for high. The equipment includes the carbureter, steering column control, hot air drum, flexible tubing, manifold gasket and the necessary screws and bolts.

### Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	49½	55	..
*J. I. Case T. M. Co. pfd.	..	78	..
Chalmers Motor Co. com.	2	4	..
Chalmers Motor Co. pfd.	..	50	..
*Chandler Motor Co.	62	62½	..
Chevrolet Motor Co.	54	57	-3
*Fisher Body Corp. com.	21	34	..
*Fisher Body Corp. pfd.	75	85	..
Fisk Rubber Co. com.	..	45	..
Fisk Rubber Co. 1st pfd.	100	105	..
Fisk Rubber Co. 2nd pfd.	75	85	..
Firestone Tire & Rubber Co. com.	98	100	-1
Firestone Tire & Rubber Co. pfd.	98	101	-1
*General Motors Co. com.	89½	89¾	+7½
*General Motors Co. pfd.	73½	75½	+½
*B. F. Goodrich Co. com.	34½	35½	-½
*B. F. Goodrich Co. pfd.	95	100	+4½
Goodyear Tire & Rubber Co. com.	142	145	-2
Goodyear Tire & Rubber Co. pfd.	96	98	..
Grant Motor Car Corp.	2	3	..
Hendee Mfg.	10	20	..
Hupp Motor Car Corp. com.	2	3	-¼
Hupp Motor Car Corp. pfd.	75	84	-7
International Motor Co. com.	8	11	..
International Motor Co. 1st pfd.	30	50	+5
International Motor Co. 2nd pfd.	15	30	..
*Kelly-Springfield Tire Co. com.	39	41	-¼
*Kelly-Springfield Tire Co. 1st pfd.	77	83	-2
*Lee Rubber & Tire Corp.	11	11½	-2
*Maxwell Motor Co., Inc. com.	22½	24	-¼
*Maxwell Motor Co., Inc. 1st pfd.	51½	52	+½
*Maxwell Motor Co., Inc. 2nd pfd.	14½	15	+¾
Miller Rubber Co. com.	..	120	..
Miller Rubber Co. pfd.	97	99	+1
Packard Motor Car Co. com.	110	125	-10
Packard Motor Car Co. pfd.	93	97	-1
Paige-Detroit Motor Car Co.	14	17	-4
Peerless Truck & Motor Corp.	8	11	-1
Portage Rubber Co. com.	..	115	..
Regal Motor Car Co. pfd.	10	20	..
Reo Motor Car Co.	16	18	-1
*Saxon Motor Car Corp.	5	5½	..
Springfield Body Corp. com.	..	..	..

	Bid	Asked	Net Ch'ge
Springfield Body Corp. pfd.	..	..	..
Standard Motor Construction Co.	7½	8½	+1
*Stewart-Warner Speed. Corp.	45	47	-1
*Studebaker Corp. com.	39½	39¾	+½
*Studebaker Corp. pf.	..	90	..
Submarine Boat	13	14	..
Swinehart Tire & Rubber Co.	..	34	..
United Motors Corp.	15½	15¾	+¼
*U. S. Rubber Co. com.	50½	50½	+¼
*U. S. Rubber Co. pfd.	95	104	..
*White Motor Co.	35	38	-½
*Willis-Overland Co. com.	17¾	17¾	+½
*Willis-Overland Co. pfd.	68	70	-2
Wright-Martin	7½	7¾	-¾

\*At close Nov. 19, 1917. Listed N. Y. Stock Exchange.

#### OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	9	..
Bower Roller Bearing Co.	..	27½	..
Chevrolet Motor Co.	54	56	-3½
Commerce Motor Car Co.	..	7	..
Continental Motor Co. com.	5	5½	-¾
Continental Motor Co. pfd.	..	..	..
Edmunds & Jones com.	..	28	..
Edmunds & Jones pfd.	90	94	..
Ford Motor Co. of Canada.	165	174	..
Hall Lamp Co.	..	18	..
Michigan Stamping Co. com.	12	12¾	+¾
Motor Products	..	..	..
Packard Motor Car Co. com.	113	118	..
Packard Motor Car Co. pfd.	..	94½	..
Paige-Detroit Motor Car Co.	11½	14	..
Prudden Wheel Co.	..	14	..
Reo Motor Car Co.	16¾	17¾	-2/8

#### INACTIVE STOCKS

Atlas Drop Forge	..	35½	..
Kelsey Wheel Co.	80	88	..
Regal Motor Car Co.	..	26½	..

## 616 Miles in 6 Hr. New Record

De Palma in Packard Now  
Holds All Records from 10  
Miles Up to This Mark

NEW YORK, Nov. 16—A new world's record for 6 hr. was established to-day by De Palma at the Sheepshead Bay Speedway when he covered 616 miles in a Packard Twelve. His actual distance was 633.12 miles, because of the position of the car above the mark set on the track by the American Automobile Assn. designating 2 miles to each lap. The former record was held by Resta, Chasagne and Guinness, who drove a Sunbeam at Brooklands 566 miles .589 yd. on October 1, 1913.

De Palma to-day averaged officially 102.8 m.p.h. for the 616 miles, his actual average for the 633.12 miles being 105.52 m.p.h. At no time during the record trial did his average m.p.h. fall below 101. His highest official average was 110, covered in the first hour. The m.p.h. excluding 15 min. 20 sec. stops was 111.

The Packard now holds all records from 10 miles up to 600, regardless of class or free-for-all classifications for cars under 300 cu. in. The car empty weighed 2480 lb. To this may be added the weight of 11 gal. of oil, or 88 lb.; 35 gal. of gasoline, or 227 lb.; 5½ gal. of water 42; De Palma's weight 170 lb., and his mechanic, 135 lb. At 111 m.p.h. the r.p.m. was 3000, neglecting slippage. The motor traveled 4000 miles before to-day's test and during the 6 hr. turned over 10,355,500 revolutions.

Gasoline consumption averaged 9 m.p.g., the actual consumption being 67 gal. Eight gal. of oil were taken on. Eight tire changes were made. One right front went 477 miles when it had to be changed on account of being worn out.

Another on the same wheel lasted 52 miles, the tread coming off. Two right rears went respectively 217 and 234 miles and were then changed on account of wearing out. A left front was changed after it had gone 518 miles because of wearing out. Three left rears were changed on account of wearing out after they had gone respectively 217, 260 and 69 miles.

No stops were made in the first 2 hr. The first stop was made at 228 miles when two rears and 20 gal. of gasoline were taken on. Two minutes and 29 sec. were lost. No stops were made in the 4th hr. Two rears and a right front were changed at 452 miles when 20 gal. of gasoline and 5 gal. of oil were also taken on. The time wasted here was 3 min. 57 3/5 sec. A left front tire was changed at 520 miles, after the Packard had traveled 4:55:37.2. One minute and 30 sec. was wasted. At the 524th mile, three spark plugs and a left rear tire were changed, losing 6 min. and 3 sec. At 532 miles, 23.8 sec. was wasted putting on a right front tire. That was the last stop.

Times for each hour:

Hr.	Actual M.P.H.	Actual Distance	Official M.P.H.	Official Distance
1	112.96		110	110
2	112.45	224.91	109.5	219
3	109.85	329.56	106.9	320.9
4	110.14	440.56	107.2	428.8
5	107.14	535.72	104.4	522.0
6	105.52	633.12	102.8	616

The former records are as follows:

Hr.	Distance	M.P.H.
1.....107	miles 672 yards.....	107.95
2.....195	" 189 ".....	97.55
3.....287	" 856 ".....	95.83
4.....380	" 628 ".....	95.09
5.....473	" 464 ".....	94.65
6.....566	" 589 ".....	94.39

New Jersey Endurance Contest Nov. 30

NEWARK, N. J., Nov. 19—The annual endurance run of the local car dealers will be held again this year. The New Jersey Automobile and Motor Club has decided on Nov. 30 and Dec. 1 as the dates for the annual 24-hour run.

## Coke Prices Fixed by Garfield

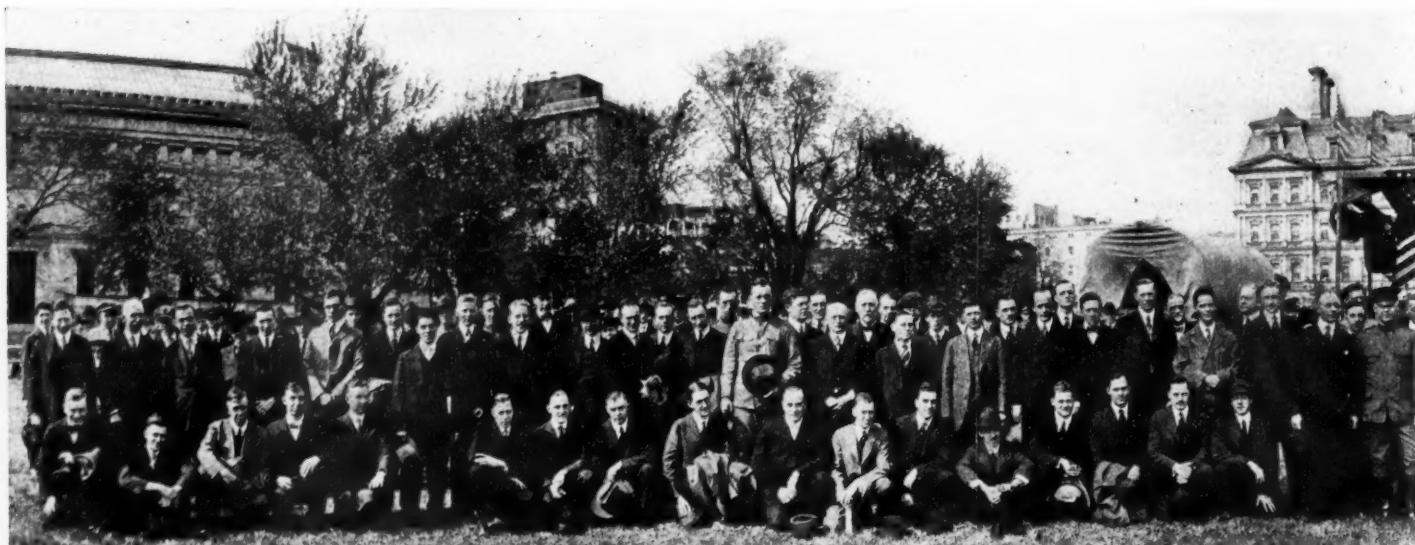
Affects Selected Foundry By-  
Product Throughout Country  
—Selling at \$6 to \$7

NEW YORK, Nov. 20—Coke prices as fixed by the Fuel Administration Nov. 20 were placed at \$6 per ton of 2000 lb. of by-product coke; \$7 per ton of selected foundry coke by-product, and \$6.50 per ton for by-product coke over 1 in. size. The maximum price of gas coke per ton shall be the price established by the United States Fuel Administration for anthracite coal in the same locality, it was announced. The coke prices as fixed apply to tons of 2000 lb. f.o.b. on cars at the plants where the coke is manufactured. Coke has been selling at \$13 to \$15 a ton. Contract coke was selling at \$8 a ton.

"All the maximum prices shall apply to car lots to be sold to consumers or to dealers for wagon deliveries; any commission paid to selling agencies or margins allowed to jobbers shall be paid by the vendors and shall not be added to the prices established hereby," Administrator Garfield ordered.

"In all cases where wagon deliveries are made either by the coke producers or by dealers, a reasonable charge for such handling and delivery may be made. Such charge," it was declared, "shall be subject to approval of the State fuel administrator."

"Except for by-product coke produced in New England the maximum prices for each grade of by-product coke f.o.b. cars at point of production shall be the sum of the base price of the grade and the freight rate from the competing beehive coke district which takes the lowest rate to the point where such by-product coke is produced."



This is the first photograph to be published of the gathering of distinguished persons who took part Oct. 19, after having been driven from their



# Industrial Review of the Week

## A Summary of Major Developments in Other Fields

### Anthracite Situation Better

The production of anthracite goes steadily forward, but here, as elsewhere, are heard complaints of short car supplies and inadequate water-transportation facilities. Reports come from various points of coal "hoarding" by individual consumers. It is quite probable that the so-called "hoards" in many coal cellars are not evidences of selfishness on the part of the owners, but rather of forehandedness. Slight modifications in the rulings of the fuel administration throughout New England have resulted in somewhat of an improvement in the conditions in that territory. It is believed also that the close of the Lake navigation season and increased shipments all rail to New England will relieve the situation to a considerable degree. A modification of the priority order is promised for New York and vicinity, and it is thought that this will help matters decidedly. It is the intention that coal reaching the city by this means shall be distributed to the smallest of dealers, thus benefiting the largest number of people. There is no appreciable increase in the supply of anthracite in the yards of retailers. Embargoes upon various roads are affecting the supply of coal to Philadelphia, Baltimore and other points. Movement to the Northwest is not quite as brisk as it has been in the past.

### Inadequate Car Supplies

Mild weather throughout the Northern Central portion of the country has done much in the past week to alleviate any actual suffering which may have existed. Many manufacturing plants, particu-

### A New Service

Herewith AUTOMOTIVE INDUSTRIES supplies for the benefit of its readers a general summary of important developments in other fields of business. This is rendered possible by the editorial co-operation of leading industrial publications which are recognized authorities.

By compressing the general industrial situation into this form we hope to give our readers a clear and comprehensive idea of up-to-the-minute developments which they could otherwise secure only with considerable expenditure of time and effort.

larly in northern Ohio, have been forced to shut down temporarily, and the shortage has also affected some of the steel mills in that state. Those factories which are directly engaged in Government work have, in many instances, been able to secure priority shipment, which placed them on Easy Street, as compared with other factories not working upon this type of output. It is rumored also that rulings will be forthcoming soon as to what are essential and non-essential industries. Essential industries in that case will, of course, be given priority. In a broad sense the fuel problem of this country is now not one of production, but rather of transportation. From all regions come reports of inadequate car supplies and short-time working at the mines. The railroads have so long been a target for repressive governmental regulation that under the stress of present emergencies they are short of

both cars and motive power, with the obvious result that even when coal could be produced, provided the present labor supply was inclined to work continuously, it can not be moved. As it is, many operators are working their mines only four to five days per week.—*Coal Age*.

### Strikes Threaten Whole Oil Industry

KANSAS CITY, Mo., Nov. 14—A shut-down of the whole oil industry is threatened as a result of the aggressive unionizing movement of its employees. This movement has been pushed by the American Federation of Labor.

At the present time there is a strike of nearly 10,000 oil workers in Louisiana and in the Gulf Coast of Texas. The unions demand higher wages and recognition. So far there seems to be comparatively little objection to paying even the scale asked by the union, but the big fight seems to be coming on as to whether or not refineries should be closed or open shops.

It is estimated that, even if there is no new production for the next 6 months, output will not fall off more than 50 per cent.

### Gasoline Yield 20 Per Cent of Crude

NEW YORK, Nov. 19—The gasoline yield for the first 6 months of 1917 is averaging 20 per cent of the crude oil production, according to the Bureau of Mines at Washington, which has also completed the figures for 1916 on the production of refinery products. Gasoline yield from crude oil is much higher than kerosene, which is only 13 per cent.



in the official welcome to the first standardized United States Army Trucks which reached Washington, assembly places at Rochester, N. Y., and Lima, Ohio.

Lubricating oil averaged 5.8 per cent. The Burton Process has accounted in part for the high percentage of gasoline yield. There has been an increase during the first 6 months of 1917 over the year for 1916. The east coast country yielded in 1916 20 per cent of gasoline as against 22 per cent the first 6 months of 1917. The western Pennsylvania and eastern Ohio districts produced 21 per cent of gasoline in 1916 as against 24.6 per cent in 1917. The western Ohio and Indiana fields produced 34 per cent as against 36 per cent for 1917.

The refinery operations for the first 6 months of 1917 show a yield of 143,189,374 barrels of crude oil; 1,223,379,899 gal. of gasoline; 784,411,291 gal. of kerosene, and 350,358,041 gal. of lubricating oil.

#### Fuel Scarcity Hits Steel

The steel industry is making harder work than ever of its effort to meet war conditions, with an increasing handicap from fuel scarcity and transportation failures, and the limitation of output due to the conflicting purposes of those in authority from whom steel makers now take their orders. Bankings of blast furnaces from coke shortages keep up and at Youngstown steel output at some plants has been cut nearly 50 per cent.

Dislocations in rolling mill operation are more marked. While these have been commonly laid to irregular gas coal and coke supply, there is increasing evidence of the shifting of consumption and in some lines its reduction, and the embargoes on exports have left some mills with occasional gaps which selling forces are trying to fill.

A feature of the week has been the wide and prompt acceptance by the warehouses of prices which represent drops of \$10 to \$20 per ton in many products and as much as \$50 per ton in sheets and \$70 in plates. Being on a Pittsburgh basis the new jobbing schedules carry considerable freight additions for a very large part of the tonnage involved.

While a good amount of finished steel for use on Government contracts is sold currently, little business is coming out for rolled material for other purposes. Plate inquiries include one for 20,000 tons of 3/16 in. plates cut in 30-in. squares for the Government. Plate prices quoted by certain mills able to make early shipment continue higher than the Government basis, but are approaching.

Labor supply has improved in spots, but the problem will be made more serious by the second draft. It is plain that dilution of skilled labor must begin soon, particularly under the urgent call of the Government for thousands of mechanics for service in France.

The original embargo order of the War Industries Board, cutting off entirely shipments of chrome steel for the manufacturers of pleasure automobiles, has been modified pending the report of the automobile industries committee as to the minimum amount the industry should be allowed. The War Industries Board wants a cut to 20 per cent of present consumption, but may permit a gradual reduction.—*Iron Age*.

## War Trucks Average 3.95 M.P.G.

### 125 Miles Per Day Hauling Full Load of 3½ Tons—No Serious Faults

WASHINGTON, Nov. 19—The new heavy duty war trucks, continuing on their 24-hr. runs, averaged better than 125 miles per day during the past week and attained a record of 3.95 miles per gallon of gasoline, which was achieved with the trucks hauling the full rated load of 3½ tons in addition to carrying four men on each machine. Remembering that the commercial trucks of 5-ton capacity hauling a load only one way and returning empty average only between 3 and 4 m.p.g., this record for the new war trucks is quite good.

Up to this time the hundreds of miles of driving have failed to display any important faults and prove the efficient design and construction of the trucks. The daily test drives, starting early each morning and ending at midnight, are made over the heaviest going roads near Washington by day and over the better roads by night.

#### Tractor Developed in Pennsylvania

WAYNESBORO, PA., Nov. 17—A new tractor has been completed by the Frick Co. of this city and given a test. It has a rating of 12-25 hp., is fitted with an Erd engine and runs on kerosene. The engine is set parallel with the axles so it is not necessary to transmit the power through bevel gears. It is so located that it does not obstruct the driver's view of the furrow ahead. One man can operate the tractor, which weighs 5600 lb.

It is planned to manufacture 400 of these machines by next spring.

#### Metzger Heads Detroit Club

DETROIT, Nov. 21—The directors elected for the Detroit Automobile Club yesterday are: W. E. Metzger, president; E. H. Hines, first vice-president.

#### Studebaker Establishes Ohio Branches

SOUTH BEND, IND., Nov. 19—Studebaker Co., Inc., has taken over the distribution of Studebaker cars throughout Ohio and lower Michigan by establishing three branches, one at Toledo, one at Dayton, and one at Cincinnati. The Toledo branch is under the direction of A. J. Brechtel, former assistant commercial car sales manager; C. T. O'Donnell, formerly assistant branch manager at New York becomes branch manager at Cincinnati, and A. H. Remsen, formerly office manager at the South Bend factory, has been made assistant branch manager at Buffalo. J. C. Dub, formerly retail branch manager at Worcester, Mass., becomes assistant branch manager and retail manager at Cincinnati.

#### Boston Dealers Taking on New Cars

BOSTON, Nov. 17—There has been a great rush on the part of makers to get

dealers in Boston, and a number of the Boston men have been anxious to get cars selling in the moderate-priced class as additions to their line in anticipation to the cut down of factory production. As a result the Bryant G. Smith & Sons Co., Cole Eight agent, has taken on the Elgin; the King Motors, Inc., has added the Elcar; a new company has been formed to sell the Olympian; the Alfred Cutler Morse Co., handling Renault and other high-priced cars, takes the Westcott, while Frank L. Brown, Premier dealer, now has the Empire, too, for Boston. There is a deal pending for another low-priced car, and the men behind it plan to try to get a big company going to take 2500 of the machines. In addition to this there has been a scurrying on the part of some of the Boston dealers to get truck lines going. George W. MacBride, Inc., the Lee tire man, has taken on the Phenix Truck Maker of Chicago; the Wilson truck has been picked up by the Hawley-Cowan Co., Saxon dealers; the J. M. Linscott Co., Reo agent, has added the Republic truck; the C. S. Ransom Co. has been formed to market the Truxton and Bethlehem; and the New England Velie Co. has added the Fulton. Some of the other dealers are anxious to get cars and trucks if they can be assured of real deliveries.

#### Pullman Property Re-Auctioned Dec. 4

CHICAGO, Nov. 14—The entire property of the defunct Pullman Motor Car Co., York, Pa., excepting the name and good will is to be sold at auction at the factory commencing Dec. 4 by Samuel L. Winternitz & Co., Chicago. The entire assets of Pullman were sold at a previous auction and the property excepting the name and good will were obtained by Winternitz who will re-sell them. This consists of the real estate, machinery, equipment, parts, merchandise, trucks and finished cars.

#### Touring Limousine for Hudson

NEW YORK, Nov. 19—The Hudson Motor Car Co., Detroit, has brought out a touring limousine selling at \$3,150. It combines all the advantages of the limousine and the sedan. By raising the glass partition the driver is separated from the passenger compartment. With the partition lowered the car is a sedan. The rear compartment is heated through the medium of a radiator in the floor. Provision is made for carrying luggage on the roof.

#### Cruiser to Build 1000 Cars

MADISON, WIS., Nov. 19—Pending the construction of its new plant, contracts for which are being awarded at this time, the Cruiser Motor Car Co. is carrying on manufacturing operations in leased quarters in order to complete two of its convertible touring-camping cars in time for the opening of the New York show, following which it will be sent around the show circuit. Work on the first unit of the plant will begin shortly after Nov. 15. The building will be 70 by 263 ft., part two stories high, designed for an output of 1000 cars during the first year.



## Barger Truck Co. to Make 4-Wheel Drive

INDIANAPOLIS, Nov. 18—The Barger Truck Co., this city, has been incorporated with a capitalization of \$50,000 to manufacture motor trucks. The directors are Henry W. Barger, Olga Barger, and Walter Brevet. The company announces that a four-wheel-drive truck will be manufactured.

EAU CLAIRE, WIS., Nov. 17—The United States Auto Gear Shift Co., Eau Claire, Wis., has been organized with a capital stock of \$1,000,000 by Eau Claire capital to manufacture and market a new type of hydraulic gear-shifting device for motor vehicles of all kinds. The device was invented and has been patented by L. A. Laursen, and best known as designer of the Laursen automatic pump, now being manufactured in Eau Claire and Menomonie, Wis. Mr. Laursen perfected the device about a year ago and since that time has been giving it exhaustive practical tests in a passenger car in which he has driven between 8000 and 10,000 miles over all kinds of roads and various conditions in the north-western states.

The new company has purchased a large tract of land near the plant of the Gillette Rubber Co. at Eau Claire and expects to break ground before the beginning of the new year for a shop group costing about \$50,000. The Laursen hydraulic gearshift will be manufactured exclusively for the time being, and later the production of other devices invented by Mr. Laursen will be undertaken. The gearshift will retail at about \$55. It weighs only 16 lbs. It is operated by hydraulic pressure and oil is used as the fluid.

Officers have been elected by the new company as follows: President, N. J. Whelan; vice-president and secretary, L. A. Laursen; treasurer, J. T. Joyce; directors, L. A. Laursen, J. T. Joyce, N. J. Whelan, R. P. Gillette and Edward Hutchens.

## Buckeye Temporarily Discontinues Truck Manufacture

ANDERSON, IND., Nov. 19—The Buckeye Mfg. Co. has discontinued the manufacture of commercial cars for the present due to the execution of a Government order.

## \$5 More Per Car for Overland Delivery

OMAHA, NEB., Nov. 19—The Murphy-O'Brien Auto Co., Dodge distributors, is planning a drive away from Detroit because of the freight car congestion. A cost estimate has been made and it is expected that an increase of about \$5 per car over the freight expenses will pay for the drive away. About thirty-five dealers will come, bringing enough prospects to drive away 100 automobiles.

## Girls Build Morgan & Wright Tires

DETROIT, Nov. 19—About 200 girls are employed at the tire building plant of

## New Companies Formed

*Latest additions to ranks of Automotive Industries*

ALBANY, N. Y., Nov. 19—The Bowen Products Corp. of Auburn has been incorporated to manufacture airplanes, machinery, etc., with a capital of \$2,500,000. The incorporators are W. B. Reynolds, New York; E. T. Williams, Brooklyn, and others.

GRAND RAPIDS, MICH., Nov. 17—The Plain View Mfg. Co. has been organized to manufacture a filling station device and will locate its plant at 335 Lexington Avenue, N. W. W. A. Merrill and W. C. Mounteer are organizers.

CLEVELAND, Nov. 16—The Ohio Freight Delivery Co. has been organized to supply trucks to meet the demand for short distance freight service. Several fleets of trucks have been put into service, and two units have been established for the collection and distribution of freight.

The first of these has branch stations at Cleveland, Elyria, Lorain, Norwalk and Sandusky, the second at Cleveland, Bedford, Ravenna, Akron and Barberton. Schedules are being distributed giving the rate for each 100 pounds carried between any two points, and charge is being made on the basis of mileage. A special price scale is made on shipments of less than 2 tons made in the mercantile sections of the larger cities.

The offices of the new company are at 604 Long Avenue, S. W. A. C. Thomas is president.

LOS ANGELES, CAL., Nov. 19—The Tractor-Train Co., 1346 Wall Street, this city, has been organized to operate a machine shop and tractor plant.

the Morgan & Wright Co. The tires are built practically from start to finish by these girls and because of the care required in tire construction this class of labor is entirely satisfactory. The girls are garbed in overalls instead of the conventional skirts, as these are found practical as well as much more safe.

## Michigan Bolt Adds

DETROIT, Nov. 19—The Michigan Bolt & Nut Works is constructing two additions to its plant which will represent an investment of approximately \$100,000. One unit just completed is 80 by 120 ft. and another being constructed is 230 by 90 ft. and will be used for storing stock.

## Orloff Adds Hupmobile

DETROIT, Nov. 19—The Leonard B. Orloff Co. will in the future distribute the Hupmobile in southern and eastern Michigan in addition to distributing the Mitchell cars as formerly. Some time

## Seiberling Heads U. S. Traction Wheel Co.

INDIANAPOLIS, Nov. 18—The United States Traction Wheel Co., of Kokomo, Ind., has been incorporated with a capitalization of \$100,000 to manufacture wheels for tractors. The wheels will be of the web type and will be sold to tractor manufacturers on a royalty basis. A. G. Seiberling, general manager of the Haynes Automobile Co., heads the new corporation, other directors being Harry F. Tate and David McCosker.

ELIZABETH, N. J., Nov. 19—The Standard Aircraft Corp., which recently bought the John Stephenson Co. plant here and which also has a factory in Plainfield, N. J., has incorporated in New York with a capital of \$5,000,000, divided into \$2,000,000 preferred and \$3,000,000 common. Harry Bowers Mingle is president of the new corporation, and the board of directors is composed of the following: C. H. Day, C. V. Bradford, D. L. Meenan, J. C. G. Stratt and H. B. Mingle.

## 8000 Employees

Employment of more than 8000 men and women is expected to be taken on in the new plant to take care of large Government orders. The new plant here covers 87 acres and the main buildings have more than 300,000 sq. ft. floorspace. There is also a 60-acre flying field and 5 acres of waterfront, on which will be established the hydro-airplane hangars and test sheds. This plant represents an investment of more than \$1,000,000. In addition to the two main plants the corporation has seven smaller factories in which parts of airplanes are made. It is expected that sixty airplanes a week will be the normal output of the new corporation.

BROOKLYN, Nov. 13—The Globe Auto Radiator has been formed to manufacture. A. and B. Greenblatt, 1766 Union Street, are the principal incorporators.

ago the Grasser Motor Co., formerly Hupmobile distributors, concentrated on trucks exclusively and it is for this reason that the new distributor has been appointed.

## McNaull Tire Dealers in Session

TOLEDO, O., Nov. 16—Dealers of the McNaull Tire Co. held a sales convention here this week, and about fifty representatives were present from all parts of the country. A study of tire manufacture, together with sales talks, comprised the business part of the session. B. J. Dodge, advertising manager, was in charge.

## Graham Bros. Dealers to Meet

EVANSVILLE, IND., Nov. 17—The first annual Eastern convention of dealers and distributors of Graham Bros. will be held Nov. 21 at the Knickerbocker Hotel, New York.

## Anderson Sales Manager of Templar Motors

CLEVELAND, Nov. 19—Harry W. Anderson has assumed the duties of general sales manager of the Templar Motors Corp. of Cleveland. Mr. Anderson was formerly sales manager of the Stutz Motor Car Co., and also was connected with the Premier and American. He has appointed Charles E. Bailey assistant sales manager, who formerly held like office with the HAL Motor Co.

The new Templar plant is finished and occupied. The city offices will be moved to the plant by Dec. 1. Templar cars are now in production.

L. L. Williams is designer and production manager of the Lang Body Co., Cleveland, having resigned from the Peerless Motor Car Co. The factory of the Lang Body Co. is at West 106th Street, and it is expected the production will be started on a yearly schedule of 3000 bodies about Jan. 1.

E. Harvey Mendel, for the past 18 months sales manager of the Rex Ignition Co., New York, resigned Nov. 15. He has not announced his plans for the future.

R. G. Nelson has been appointed superintendent of districts by the McGraw Tire & Rubber Co. He will have general supervision of all district offices. C. E. Pumphrey, formerly St. Louis district manager, assumes the duties of assistant sales manager with headquarters at East Palestine. R. J. Delevan, formerly a special representative, becomes St. Louis district manager.

Tom Selby, formerly with the Dry Climate Rubber Co., Denver, has been appointed production manager for the Toliver Tire & Tube Co., Denver, which has started to manufacture its own tubes.

John H. Diehl, sales manager of the Mason Tire & Rubber Co., has been elected a director of the company.

Walter E. Holland has been made research engineer for the Philadelphia Storage Battery Co., Philadelphia.

C. R. Murphy has been elected secretary of the Lawson Aircraft Corp., Green Bay, Wis., to succeed C. I. Smith, who resigned because of other interests.

P. A. Elsesser, for 25 years connected with the Martin Carriage Works and the Martin Truck & Body Corp., York, Pa., severed his relation with that organization this week and, for the present, will devote all his time in the Y. M. C. A. war work. With the recent reorganization, following the acquisition of the industry by the Martin Truck & Body Corporation, Mr. Elsesser has acted as general manager.

P. J. Dazy has become sales engineer of the Buda Motor Co., Harvey, Ill., assistant to Lon Smith, sales manager. He

## Men of the Industry

*Changes in Personnel and  
Position*

was formerly with the Blodgett Engineering & Tool Co.

George Kooms is in charge of service and the sales department of the Buda Motor Co., Harvey, Ill. He was formerly experimental engineer.

J. H. Garland is production manager of the Harroun Motors Corp., Detroit. He was formerly with Hupmobile and King.

H. A. Conlon, formerly assistant sales manager of the Federal Motor Truck Co., has joined his old chief, John F. Bowman, who is now vice-president and sales director, of the Acason Motor Truck Co., Detroit.

Frank Langdon is a lieutenant in the quartermaster's division of the army. He was formerly assistant advertising manager of the Cadillac Motor Co.

Charles G. Percival, advertising manager of the Van Cortlandt Vehicle Corp., New York, Eastern distributor for the Peerless, has been commissioned a captain in the United States Army and has been called to the Motor Equipment Department of the Ordnance Department.

F. L. Sanford has been appointed manager of the New York branch of the Studebaker Corp. He succeeds "Pop" Jewell, who has purchased an interest in a Philadelphia Studebaker distributing agency.

A. C. Bennet is manager of the Pittsburgh branch of the Buick Motor Car Co. He was formerly sales manager of the Chicago branch.

Harry W. Miller is assistant sales manager and service supervisor of the Chalmers Motor Co.

Lawrence Broering has joined the Chicago branch of the Mason Tire & Rubber Co. and will represent it in Indiana. He was formerly with the Good-year Tire & Rubber Co. in Indianapolis. Later he became manager of the Indianapolis branch of the Miller Tire Co.

John H. Rosen, manager of the Wilmington, Del., branch of the Packard Motor Car Co., has been appointed a first lieutenant in the motor section of the Ordnance Department of the U. S. Reserve Corps.

Harry E. Damon is southern representative of the Anderson Electric Car Co., manufacturer of the Detroit Electric.

## Only Four Executives of Old Chalmers Co. in New One

DETROIT, Nov. 17—Though the changes in the personnel of the Chalmers Motor Co. subsequent to its 5-year lease by the Maxwell Motor Co. have been published in AUTOMOTIVE INDUSTRIES as they occurred from time to time, the complete list of executives was not announced until recently. The following are the men that will direct the new Chalmers organization: Walter E. Flanders, president; Carl H. Pelton, assistant to the president; Walter M. Anthony, treasurer; John Flint, comptroller; J. H. Johnson, general auditor; Thomas J. Toner, director of sales, in charge of advertising; C. H. Becker, assistant sales manager; Charles Adams, production manager; E. A. Taylor, general superintendent of all factory production; W. K. Swigert, superintendent of production; William Kelly, engineer; E. J. Miles, engineer; H. M. Jerome, assistant engineer; Roy M. Hood, purchasing agent; Gordon Muir, advertising manager; J. R. Collins, general supervisor of materials. Of the above, only four are from the former Chalmers organization, namely, C. H. Becker, H. W. Miller, W. K. Swigert and H. M. Jerome.

H. E. Talbot, Dayton Metal Products Co., Dayton, O., and Noble Foss, president, Sturtevant Aeroplane Co., Jamaica Plains, Boston, Mass., were appointed to the Aeronautical Standards Division.

W. R. Rice, formerly special representative of the Dixie Motor Car Co., and state examiner in the Department of Commissioner of Motor Vehicles, is manager of the Kentucky Dixie Motors Co., Louisville, Ky., handling the Dixie Flyer and Old Hickory truck.

Robert F. Wilson of the Laboratory and Tire Testing department of the Miller Rubber Co., Akron, Ohio, has left for France where he will serve in the capacity of tire expert.

L. A. Freedman has succeeded Edward Durant as secretary of the Aeronautical Society of America, New York.

J. H. Ficken, for the last 3 years the New York salesman for the Kelly-Springfield Tire Co., has resigned from that concern to become the representative of the Carlisle Cord Tire Co. in the East.

T. B. Entz, president of the Entz Automobile & Battery Co., St. Louis, will join the staff of the Gould Storage Battery Co. as engineer to work on submarine battery problems. Mr. Entz has been in St. Louis 13 years as head of the company he now leaves, which for several years has been representatives of the Philadelphia Storage Battery Co. Ernest Board, secretary of the Entz company, will succeed to the management of that company, and M. J. Cline, formerly secretary of the Battery Service Co., will take charge of the Philadelphia company's interests.



## Diamond Chain to Add Large Plant

YORK, PA., Nov. 19—The Diamond Chain Co., engaged in the manufacture of a patent skid chain for motor trucks, this week closed a deal for the erection of a large new plant to employ 1200 persons. The new factory building will be located on a 5-acre tract at the intersection of Center Street and the Pennsylvania Railroad Company's tracks.

The industry was started 12 years ago as a mutual partnership by several York men. About three years ago the company was incorporated. On July 3, last, the Rowe-Calk Co. of Plantsville, Conn., purchased all of the stock held by the Yorkers, except that in the possession of S. M. Horn, president of the company. Following the purchase of this stock the company was reorganized. It is the purpose of the purchasing company to use the present plant of the Diamond company as a feeder to supply the Plantsville, Conn., plant with the chain to manufacture the skid chains for motor trucks. The skid chains manufactured by the concern have been adopted by the United States Government as the official chains for use on its motor trucks.

On the new location purchased by the company a one-story building, 500 ft. long, 50 ft. wide and large enough to accommodate 184 forges, will be erected. On the tract will also be built a machine shop, a drop forge plant and two buildings, four stories in height, for automatic machines, where specialties are to be made. The nature of this article is not divulged. A heat treating plant is also to be erected on the tract.

### \$1,000,000 Subscribed by Fisk

CHICOPEE FALLS, MASS., Nov. 12—The Fisk Rubber Co. and its employees together subscribed \$1,000,000 in Liberty bonds.

### No Natural Gas for Canadian Ford

FORD, ONT., Nov. 17—The Windsor Gas Co. has cut off the supply of natural gas to the Ford Motor Co., the Dominion Stamping Co. and many other large consumers in order to prevent a natural gas famine. Low pressure is given for the reason of this move. Due to the coal shortage many of the manufacturers are using oil as fuel.

### Goodrich Rewards Suggestions from Employees

AKRON, Nov. 17—The B. F. Goodrich Co. employs the suggestion ideas from employees on benefiting its production and recently distributed prizes for suggestions received in the past year. From 801 employees 1266 suggestions were received, the majority coming from the men but many from the women. One man had presented 25 suggestions and received prizes for four of them. The rewards are not made according to any fixed schedule. They vary with the nature of the suggestion, some beginning at \$25 each and others as low as \$9 each.

### Electric Auto-Lite Service Men Convene

TOLEDO, Nov. 17—The Electric Auto-Lite Corp. held a 3-day service repre-

## Current News of Factories

*Notes of New Plants—Old  
Ones Enlarged*

sentative convention starting Nov. 12 and about 200 delegates were present. The purpose of this convention was to better the Auto-Lite service by exchanging ideas, and the program for each day called for an inspection of some part of the manufacture of the starting, lighting and ignition systems. The company defrayed all of the expenses of the representatives for the trip to Toledo and back. R. A. Hall, service director, was in charge.

### Fulton Gets Ampeco Sales

CHICAGO, Nov. 17—The Fulton Sales Co., 910 South Michigan Boulevard, has been appointed exclusive sales agent for the American Machine Products Co., manufacturing Ampeco pistons and accessories for Fords.

### Comet Plant Ready Dec. 15

DECATUR, ILL., Nov. 17—The first unit of the factory of the Comet Automobile Co., 150 x 600, will be ready for occupancy Dec. 15.

### Will Auction Ogren Nov. 22

CHICAGO, Nov. 17—The property of the Ogren Motor Car Co. will be sold at auction Nov. 22 by Samuel Winternitz & Co. The inventory value of the plant is \$135,000.

### New Plant for Rothweiler

SEATTLE, Nov. 17—Rothweiler & Co., manufacturers of gasoline handling equipment, have moved into their new plant.

### Lawson Aircraft Takes Over New Plant

GREEN BAY, WIS., Nov. 19—The Lawson Aircraft Corp. has taken over the new plant here, which has been in course of construction during the past 3 months. About 450 to 500 men can be employed in the plant. It is located diagonally across the corner of Pearl and Howard Streets from the shops which are now being used by the company. These same shops will also be kept in operation as well as the new plant.

### Stewart Motor to Add

BUFFALO, Nov. 19—The Stewart Motor Co. will build an assembly and storage building one story high and 60 by 100 ft. in size to cost \$7,500.

### Now Scott Valve Mfg. Co.

DETROIT, Nov. 17—The Roe Stephens Mfg. Co. has changed its name to the Scott Valve Mfg. Co. of Michigan, its original 30-year charter having expired. This company manufactures valves for gas, steam, water and air and also makes brass castings.

## Laurel Takes Remy Plant —Medium-Priced Car

INDIANAPOLIS, Nov. 18—The Laurel Motors Corp., Anderson, Ind., incorporated with a capitalization of \$2,000,000 has acquired the experimental plant of Remy Brothers to begin the manufacture of the Roof 16-valve overhead attachment for Ford cars. The company expects to construct immediately an additional building which will have 20,000 sq. ft. of floor space and to place a medium-priced sixteen valve car on the market. Grant L. Hudson, secretary-treasurer of the company, estimates that 1000 cars would be manufactured the first year.

### Parish & Bingham Add \$80,000 Unit

CLEVELAND, Nov. 19—The Parish & Bingham Co. will build an addition at Madison Avenue, N. W., and W. 106th Street to cost \$80,000. It will be a high one-story unit 50 by 265 ft. for steel storage, and one of two stories, 50 by 220 ft., for storing dies and miscellaneous articles.

### 7000 Holmes Cars First Year

CANTON, OHIO, Nov. 19—The Holmes Motor Co. is constructing a factory in this city providing 200,000 sq. ft. of floor space and plans a production of 7000 cars for the first year. This car is air-cooled, has six cylinders, and mounts a seven-passenger body. The weight is about 2750 lb. It is said that this car will be exhibited at both the New York and Chicago shows.

### Pan-American Rubber Buys Plant

MILWAUKEE, WIS., Nov. 17—The Pan-American Rubber Co., 721 Grand Avenue, Milwaukee, manufacturer of a cellular inner tire for pneumatic casings, has purchased the plant of the New Ideal Plaster Board Co. at South Milwaukee and already has undertaken manufacturing operations on a large scale. The equipment of the plant in Milwaukee is being transferred to the new works. Joseph T. Huebner is president and general manager of the company.

### Marshall Castings' New Plant Working

MARSHALL, MICH., Nov. 17—The Marshall Castings Co. now has twenty-five men working in its new plant at South Haven and will increase the number to 125 as fast as they can be secured. At present the volume of business is large and both the shops at Marshall and South Haven will be maintained under the present conditions.

### New York Plant for Carlisle Tire

YORK, PA., Nov. 17—The Carlisle Tire & Rubber Co., Carlisle, Pa., which has the backing of New York capitalists, will locate its plant in that city. Active operations will be begun about Jan. 1, 1918. The new industry will employ about 60 workmen, this force to be increased as rapidly as possible. At first inner tubes for automo-

bile tires will be manufactured, later a variety of rubber products to be placed in the market. Orders have already been booked to keep the plant busy for a period of 8 months. Charles S. Mooney, formerly with the Keystone Rubber Manufacturing Co., Erie, will be the vice-president and sales manager. This company has no connection with Carlisle Tire Co. of Andover, Mass.

#### Trenam Tractor Looking for Location

MILWAUKEE, WIS., Nov. 17—The Trenam Tractor Co., Milwaukee, organized some time ago by J. J. Trenam and F. M. Schuler of Milwaukee and Ed. Anderson, Fond du Lac, Wis., intends to establish a factory for the production of a 12-24 hp. tractor of the "all purpose" type. Negotiations are being carried on with business men's associations in a half dozen cities of Wisconsin for a permanent location. The company has completed five

demonstrating tractors which are shown in various localities interested in securing the plant.

#### Gorey Appoints Sub-Agents

NEW YORK, Nov. 19—J. C. Gorey & Co. has appointed two sub-agents for the Mayer carbureter. They are R. D. French, Cairo, N. Y., and B. C. Christensen, Huntington and Northport, L. I.

#### Silver Orders 500 Kisselkars

HARTFORD, WIS., Nov. 17—The Kissel Motor Car Co., Hartford, Wis., is engaged in filling an order that it regarded as one of the largest contracts for passenger vehicles ever received from a single dealer. It is said that the order will call for a total of 500 cars and is from the Silver Automobile Co., Kissel distributor in Greater New York and vicinity.

#### Hayes-Ionia to Increase Output

GRAND RAPIDS, MICH., Nov. 17—The Hayes-Ionia Co. has experienced rapid growth since its location here early in the year. At present 550 laborers are employed and twenty-one closed bodies is the present daily schedule. It is planned to increase this output to fifty bodies daily in the near future.

#### Inland Piston Ring Offices Moved

ST. LOUIS, Nov. 19—The Inland Machine Works, maker of the Inland piston ring, has removed the executive offices from 800 Mound Street to Broadway and Cass Avenue.

#### Selden Adding

ROCHESTER, Nov. 19—The Selden Motor Vehicle Co. is adding another building to its plant. It will be 160 by 230.

## Calendar

### ASSOCIATIONS

1917

Nov. 24—New York, Speedway Managers' Meeting at Offices of Contest Board of American Automobile Assn. to decide on 1918 dates.

1918

Jan. 3-4—New York Automotive Electric Assn. meeting.

### RACING

Nov. 17—Phoenix, Ariz., Two Races for Arizona Cars and Drivers at Arizona State Fair.

### SHOWS

Dec. 3-8—Akron, O., Akron Auto Show Assn., Auditorium Armory. O. G. Armstrong, Mgr.

1918

January — Kalamazoo, Mich., Kalamazoo Automobile Dealers' Assn., Armory.  
Jan. 2-9—New York, Salon, Automobile Salon, Inc., Astor Ballroom. John R. Eustis, Mgr.  
Jan. 5-12—New York Show, Grand Central Palace, National Automobile Chamber of Commerce.  
Jan. 11-19—Philadelphia, 17th Annual Show, Philadelphia Auto Trade Assn., Commercial Museum Bldg.  
Jan. 11-19—Providence, R. I., R. I. Licensed Auto. Dealers' Assn., State Armory. Percival S. Clark, Mgr.  
Jan. 14-19—Rochester, N. Y., Tenth Annual Exposition Park. C. A. Simmons, Mgr.  
Jan. 19-26—New York Motor

Boat Show, Grand Central Palace, National Assn. of Engine and Boat Manufacturers.

Jan. 19-26—Detroit, Willis Avenue Overland Service Station.

Jan. 19-27—Cleveland, Seventeenth Annual, Cleveland Automobile Show Co., Wigmore Coliseum. Fred. H. Caley, Mgr.

Jan. 19-28—Montreal, Can., Montreal Automobile Trade Assn., Ltd., Almy Bldg. T. C. Kirby, Mgr.

Jan. 21-26—Manchester, N. H., Academy. Couture Bros.

Jan. 21-26—Scranton, Pa., Scranton Motor Trades Assn., Armory. Hugh B. Andrews, Mgr.

Jan. 23-28—Allentown, Pa., Lehigh Auto. Trade Assn., Traylor Motor Co.'s Garage. P. W. Leisnering, Publicity Mgr.

Jan. 26-Feb. 2—Chicago, National Chow, Coliseum and Armory, National Automobile Chamber of Commerce.

Jan. 26-Feb. 2—Chicago, Salon, Elizabeth Room of Congress Hotel.

Jan. 26-Feb. 2—Harrisburg, Pa., Capital City Motor Dealers' Assn., J. Clyde Myton, Mgr.

Jan. 26-Feb. 2—Harrisburg, Pa., Harrisburg Motor Dealers' Assn., Emerson-Brantingham Bldg. J. Clyde Myton, Mgr.

Jan. 28-Feb. 2—Buffalo, N. Y., Buffalo Automobile Dealers' Assn., Broadway Auditorium.

February — Peoria, Ill., Peoria Auto and Accessories

Dealers' Assn. W. O. Ireland, Mgr.

Feb. 9-16—Bronx, N. Y., 2d Battery Armory, Bronx Automobile Dealers' Assn. D. J. Barrett, Mgr.

Feb. 11—Toledo, Terminal Auditorium, Toledo Auto Show Co.

Feb. 11-16—St. Louis, Mo., St. Louis Auto Mfrs. & Dealers' Assn., Robert E. Lee, Mgr.

Feb. 11-16—Kansas City, Mo., Third Annual National Tractor Show.

Feb. 16-23—New York, Second Pan-American Aeronautic Exposition, Grand Central Palace and Madison Square Garden.

Feb. 16-24—San Francisco, Cal., San Francisco Dealers' Assn., Exposition Auditorium. G. A. Wahlgreen, Mgr.

Feb. 18-23—Grand Rapids, Mich., Automobile Business Assn., Klingman Building. Ernest T. Conlon, Mgr.

Feb. 18-23—Newark, N. J., N. J. Auto Exhibition, Co. G. First Regiment Armory. Claude E. Holgate, Mgr.

Feb. 18-23—Des Moines, Ia., Des Moines Automobile Dealers' Assn., Coliseum. C. G. Van Vliet & Dean Schooler, Mgrs.

Feb. 18-23—Springfield, Ohio, Springfield Auto Trades Assn., Memorial Hall. C. S. Burke, Mgr.

Feb. 18-23—Waterbury Conn., United Shows Co.

Feb. 18-24—Des Moines, Ia., Second Annual Truck, Auditorium. Dean Schooler & C. G. Van Vliet, Mgrs.

Feb. 18-25—Pittsfield, Mass.,

State Guard, State Armory. James J. Callaghan, Mgr.

Feb. 18-27—So. Bethlehem, Pa., Fourth Annual (cars 18-23; trucks 25-27), Coliseum. J. L. Elliott, Mgr.

Feb. 22-March 9—Brooklyn, N. Y., Brooklyn Motor Vehicle Dealers' Assn., Twenty-third Regiment Armory. I. C. Kirkham, Treas.

Mar. 1—Lyons, France, Third Sample Fair.

Mar. 2-9—Pittsburgh, Pa., Automobile Dealers' Assn. of Pittsburgh, Motor Square Garden. John J. Bell, Mgr.

Mar. 19-24—San Francisco, Cal., Motor Truck Dealers of San Francisco, Auditorium. Ivan R. Gates.

Mar. 19-24—Cedar Rapids, Ia., Cedar Rapids Auto Trade Assn., Auditorium.

Apr. 9-13—Stockton, Cal., San Joaquin Auto Trade Assn. Samuel S. Cohn, Mgr.

Sept. 23-28—Chicago, National Accessory Show for Fords, Coliseum.

### S. A. E.

Nov. 22—Pennsylvania Section Meeting.

Dec. 5—Buffalo Section at Statler Hotel.

Nov. 23—Mid-West Section at Chicago Automobile Club.

Dec. 5—Tractor Standards Committee Meeting at Minneapolis Section offices.

Jan. 10—New York, Automotive Dinner at Hotel Biltmore.

Feb. 1—Chicago, War Dinner during Winter Meeting.

## Engineering

American Railway Master Mechanics' Assn.  
American Institute of Electrical Engineers.  
Master Builders' Assn.  
American Society of Heating and Ventilating Engineers.  
Association Iron and Steel Electrical Engineers.  
Mining and Metallurgical Society of America  
Society of Automotive Engineers.

### DECEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.  
3—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.  
11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.  
13—Amer. Soc. Heat. & Vent.

Illuminating Engineering Society.  
National Electric Light Assn.  
National Gas Engine Assn.  
American Society for Testing Materials.  
American Institute of Metals.  
American Foundrymen's Assn.  
Society Naval Architecture and Marine Engineers.

Engrs. monthly meeting Penn. section at Phila.  
13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.  
15—Assn. Iron & Steel Elec. Engrs. monthly meeting

Pittsburgh section.  
17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.  
20—Mining & Met. Soc. Amer. Monthly meeting New York section at Engrs. Club.